THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXV. No. 610.] LONDON, JANUARY 19, 1875. [27TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
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These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
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Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
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Warranted to Measure correctly, and not to vary.
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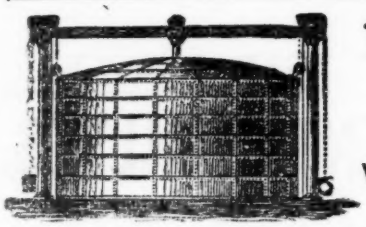

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Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

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EVERY DESCRIPTION OF GAS APPARATUS.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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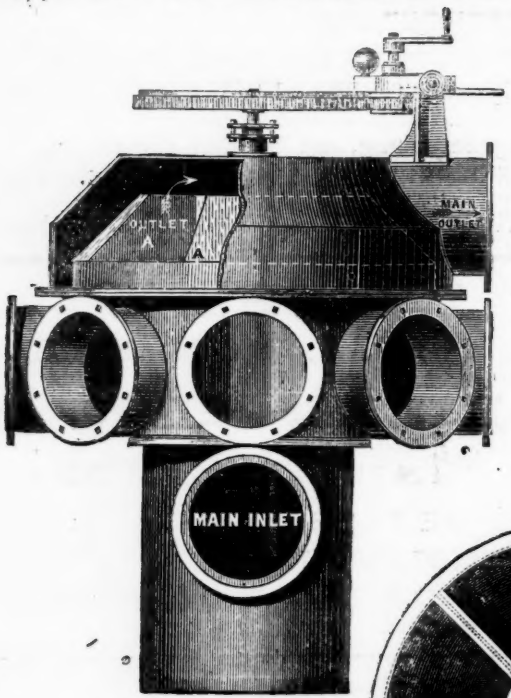
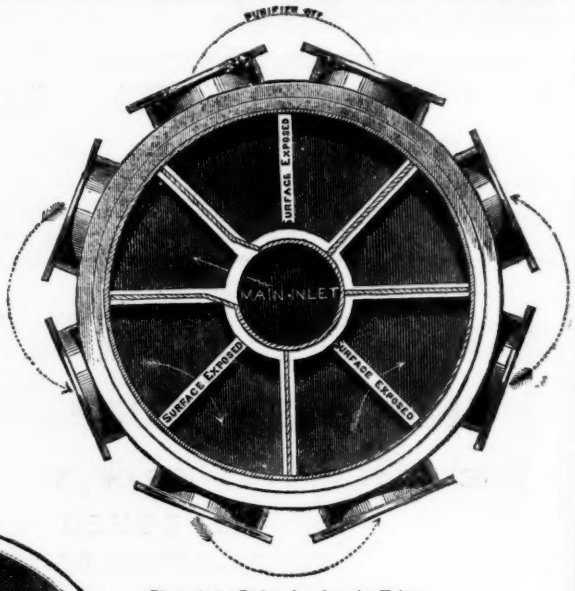
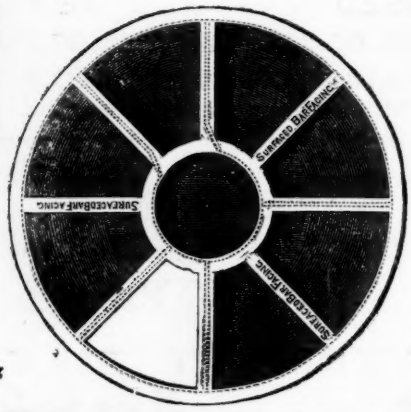
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.

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PATENT IMPROVED SEAL
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SAVES COAL, RETORTS, FUEL, LABOUR, TIME, SPACE, AND CAPITAL.

PREVENTS STOPPAGE OF ASCENSION-PIPES, DEPOSITION OF CARBON IN RETORTS, THICKENING OF TAR IN HYDRAULIC MAIN.

GIVES MORE GAS PER TON OF COAL, WITH HIGHER ILLUMINATING POWER, SATISFACTION, AND PROFIT TO SHAREHOLDERS AND MANAGERS.

IS STRONG, SIMPLE, EASILY FIXED AND WORKED, AND THOROUGHLY EFFICIENT AT ALL TIMES.

TESTIMONIAL.

Gas-Works, Guildford, Sept. 15, 1874.

GENTLEMEN,—The five retorts fitted with your Patent Moveable Seal for Dip-Pipes, on June 30, have been in constant use since that date, and have worked in a most satisfactory manner.

These Retorts are still quite clean and free from carbon, whilst others not so fitted, after being at work eight weeks, required scurfing, having a deposit of carbon 2 inches in thickness on the inside.

I also find a slight increase in the yield of gas per ton of coal carbonized, although your Patent Seals are fitted to but one-fifth of the Retorts now at work.

As your statements respecting your apparatus are fully confirmed by the results obtained in practical working, I should wish you at once to fix one to each of the ovens at these works, that I may obtain all possible advantage during the coming winter.

Yours truly,

Messrs. Caffall, Thomas, and Co., Limited, 28, Gracechurch Street, E.C. JOS. SHAW, Manager.

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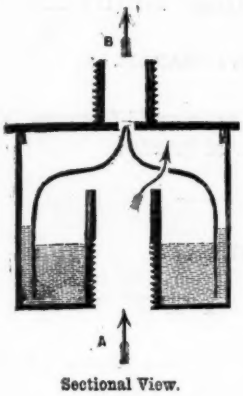
Sole Licensees and Agents for the United Kingdom of Great Britain,

SIDNEY LEONI AND CO.



Sectional View.

Glycerine neither evaporates nor freezes at ordinary degrees of temperature.

Inside a Lamp.

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The RHEOMETER is a new apparatus of measurement; it is entirely made of "metal," and works "inside a closed vessel." It determines the quantity of gas to be consumed; and this quantity remains unchangeable, whichever be the burner employed, and whatever be the pressure.

ADVANTAGES.

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Subscriptions by the hour are no longer a matter of difficulty; in such cases the "sealed" Rheometer replaces the ordinary meter.

For Town Lighting.—The Rheometer is a guarantee that the contract for lighting is duly carried out. Thus, good burners may be adopted, and the lighting thereby improved, without the gas company having any interest in intervening to oppose such a measure.

All Orders should mention what quantity per hour the Rheometer is intended to regulate.

Depot: At the ECONOMIC GAS STOVE COMPANY, 74, STRAND, ADELPHI, W.C.,

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PUBLIC LIGHTING

ON THE

AVERAGE METER SYSTEM.

LAMP METERS, IN CAST-IRON BOXES,

FOR

Fixing in the Footway, flush with the Pavement, with roughed Lids.

NOTE. — These meters were originally invented by William Sugg, in conjunction with Mr. Thos. Hawksley, Past-President of the Institute of Civil Engineers. They have been in use at Nottingham since 1866, and are still at work. The Gaslight Company and the Corporation were both quite satisfied with the results.

They were also introduced at Folkestone in 1869 by the late Mr. T. G. Barlow, Editor of the JOURNAL OF GAS LIGHTING. The success of the system put an end to a very long and troublesome dispute between the Gas Company and the local authorities. They are still at work with the same satisfactory results.

They have since been used in several important towns, with equally good results.

No other kind of Lamp Meter has ever achieved so complete a success.

WILLIAM SUGG'S

PATENT PUBLIC LAMP GOVERNOR,

WITH

STEATITE INCORRODIBLE BURNERS.

Guaranteed to give the greatest amount of light for the quantity of gas consumed.

The amount of light for a like quantity of gas is at least 30 per cent. over that given by those burners generally employed in public lighting.

NOTE.—Many of William Sugg's original Governors first applied to public lamps are still at work in the Imperial Gas Company's Districts, where they have been in constant use, with very slight repairs, now more than 14 years.

Upwards of 400,000 of these, and those of William Sugg's later inventions, are in use in various parts of the globe.

The Patent Lamp Governor is especially serviceable for home and foreign use. It can be taken to pieces, new leathered, and put together again in a few minutes by any ordinary workman.

By the principle of Double Regulation, a finer and steadier light is secured with the greatest illuminating power, and the least loss of gas in case of the breakage of a burner.

This system can be readily applied to all Lamp Governors, new or old.

LEVER COCKS FOR POLE LIGHTING,

STRONG AND SERVICEABLE.

These Cocks are carefully made so as to avoid Stoppage by Naphthaline, Leakage, and Friction.

WILLIAM SUGG'S

POLE LIGHTERS

Are acknowledged to be the best of their kind, and are almost universally adopted.

This is one of the spécialités of the house.

LANTERNS VERY STRONG, WITH PORCELAIN TOPS.

MODERN STREET LIGHTING,

BY WILLIAM SUGG, A.I.C.E.

Price 1s. 6d.

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SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

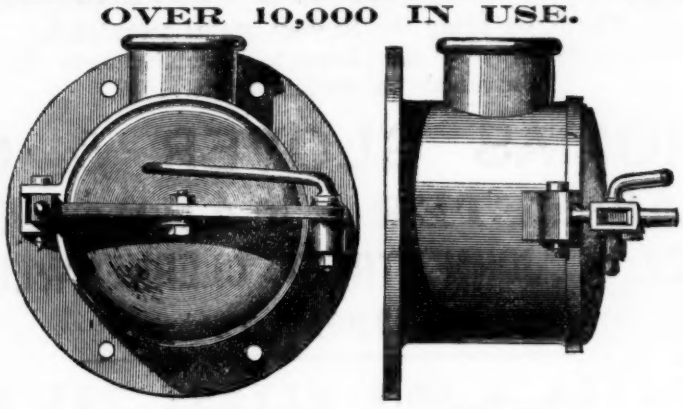
HOLMAN'S PATENT ECCENTRIC FASTENINGS & ANTI-FRICTION CATCHES.

OVER 10,000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW. SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
„ Gaslight Company, Bow Common.	„ Imperial Gaslight Company.	„ Rochdale Corporation Gas-Works.	„ Merthyr Tydfil Gas-Works.
„ London Gaslight Company.	„ Gas-Works, Arsenal, Woolwich.	„ Liverpool United Gas-Works.	„ Ystrad Gas-Works.
„ Independent Gaslight Company.	„ Commercial Gas Company.	„ Birkenhead Gas-Works.	„ St. Alban's Gas-Works.
„ Phœnix Gaslight Company.	„ Alliance and Dublin Gas-Works.	„ Birmingham Gas-Works.	„ Over Darwen Gas-Works.
„ South Metropolitan Gaslight Co.	„ Edinburgh Gas-Works.	„ Nottingham Gas-Works.	„ Aylesbury Gas-Works.
	„ Manchester Corporatn. Gas-Works.	„ Newcastle-on-Tyne Gas-Works.	„ Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial has been given:—

THE GASLIGHT AND COKE COMPANY

(*Commonly called the Chartered Gas Company*),

MESSRS. TANGYE BROTHERS AND HOLMAN. *Beckton, North Woolwich, July* 2, 1874.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly,

(Signed) G. C. TREWBY.

P.S.—We shall have very shortly about 3000 of your Lids in use.

VIENNA EXHIBITION, 1873.—The highest prize and only Medal "for Progress" for Direct-Acting Steam Pumps for general purposes was awarded to TANGYE BROTHERS AND HOLMAN, for

THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

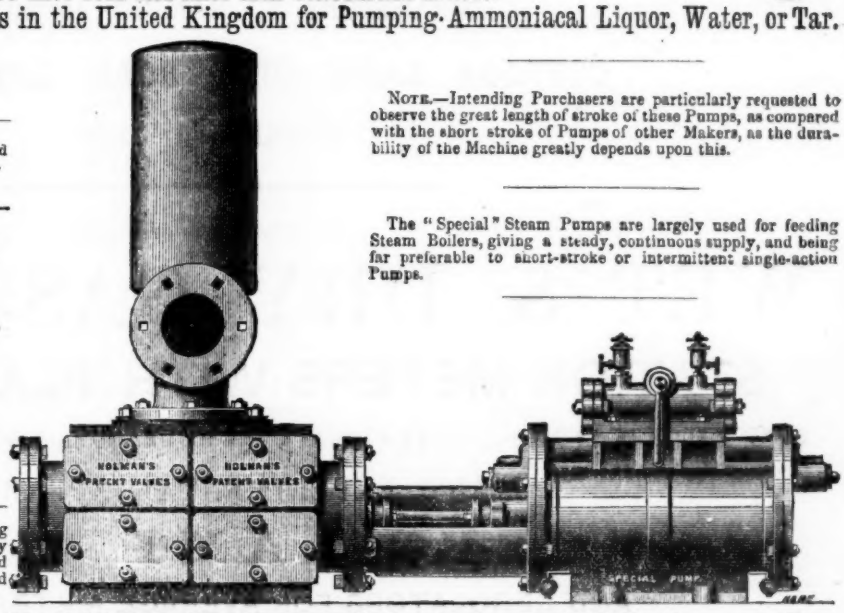
4000 have been sold since their introduction in 1867.

In use in over Eighty Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

The following are a few of the leading Sizes:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	550	£16
4*	2	9	970	18
3	3	9	2,200	18
4*	3	12	2,200	20
6*	3	12	2,200	25
4	4	12	3,900	25
6*	4	12	3,900	30
6	5	12	6,100	35
7*	5	12	6,100	40
6	6	12	8,800	40
8*	6	12	8,800	50
7	7	12	11,900	50
10*	7	12	11,900	65
8	8	18	15,660	65
10	8	18	15,660	75
10	10	24	24,400	100

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



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The "Special" Steam Pumps are largely used for feeding Steam Boilers, giving a steady, continuous supply, and being far preferable to short-stroke or intermittent single-action Pumps.

As a Stationary Fire-Engine, the "Special" Steam Pump is unequalled, and, at no great additional expense, those intended for use in Gas-Works may be proportioned so that, in addition to the ordinary work of pumping, they are available for use at any moment a fire may occur, either by day or night.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865.

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The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

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5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
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10th, Will not cost more than one-half for repair that Wet or Water Meters do;
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AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

CONTENTS.

	Page
Circular to Gas Companies:—	
The Disused Sites of the Chartered Company	77
Opposition on Standing Orders	77
The Corporation of Dublin and the Gas Engineers	77
Gas Affairs at Birmingham and the Out-Districts	77
The Corporation of Southampton and the Municipal Corporations (Borough Funds) Act	77
Fallacies as regards Low Illuminating Power	78
The Tottenham and Edmonton Gas Company v. Clarke	78
Application of Gas Profits at Middlesbrough	78
Naphtha Gas in America	78
Water and Sanitary Notes:—	
The Registrar-General's Extended Tables	78
Density of Population and Death-Rate	78
Typhoid Fever at Hull	78
The Local Board of Over Darwen	79
The Birmingham Sanitary Conference	79
Leading Article:—	
A Treatise on the Science and Practice of the Manufacture and Distribution of Coal Gas	79
Correspondence:—	
Frozen Gas-Meters	80
Scrubbers	80
Parliamentary Intelligence:—	
Gas and Water Bills, 1875	80
Legal Intelligence:—	
Edmonton Petty Sessions—Clark v. The Tottenham and Edmonton Gas Company	81
Cork Police Court—Conviction of Stokers for Unlawfully Leaving Work	83
Miscellaneous News:—	
Colchester Gas Bill	79
Death of Mr. Charles Smith, of Leeds	79
Hamilton (N.B.) Water Supply	79
Middlesbrough (Corporation) Gas Supply	80
Downham (Norfolk) Public Lighting	83
Preston Gas Company	83
Metropolis Gas Supply	84
Metropolis Water Supply	84
Birmingham (Corporation) Gas Bill	85
The Birmingham Corporation and the Gas Companies	85
The Dublin Corporation and the Gas Company	86
Adams's Gas-Regulator	86
Gas-Exhausters at the Beckton Works	86
The Thames Conservancy and Richmond Vestry	86
Newcastle-on-Tyne Water Supply	88
William Murdoch, the Inventor of Gas Lighting	88
Gas Explosion at Retford	88
Illuminating Gas from Excrementitious Matter	88
Caoutchouc and its Industrial Uses	89
On the Distillation of Ammonia in Presence of Sulphocyanides. By A. Esilman	89
Gas Explosion at Rochester	89
Construction of Gas-Works	90
Edinburgh Water Supply	90
Sanitary Progress	91
Experiments on the Reflection of Sounds from Flames and Heated Gases. By Alfred M. Mayer	92
On the Commercial Preparation of Sulphocarbonate of Potash. By M. A. Gélis	92
Iron and Coal Trades of Sheffield, South Yorkshire, and North Derbyshire	93
Iron and Coal Trades of South Staffordshire and East Worcestershire	93
Iron and Coal Trades of Lancashire	93
Coal and General Trade of the North	94
Increase in the Importation of Petroleum	94
The Gas Question at Hull	94
The Alleged Frauds in Eupion Gas Shares	94
Quality of Gas at Sheffield	94
Gas Explosion at Ashborne	94
Entertainment at the Reading Gas-Works	94
Coal Supply of London	94
Leeds Well Water	94
Register of New Patents:—	
Bell, J.—Distilling Shale for Oil and Gas	94
Oram, W.—Pumping or Forcing Air or Fluids	95
Kirkman, J.—Packing Stuffing-Boxes, &c.	95
Johnson, J. H.—Filtering Liquids from Solid Matters	95
Schanzer, L. I. L.—Drilling and Tapping Mains under Pressure	95
Howes, W. H.—Gas-Making; Gas-Meters	95
Hazlehurst, G. S.—Pumping Liquids	95
Stacey and Lace—Carburizing Air	95
Hughan, W. H.—Treating Sewage for Manure and Artificial Fuel	95
Matthews, H.—Preventing Back Flow from Sewers, &c.	95
West, J.—Gas-Making	96
Walker, W. T.—Gas-Purifiers	96
Cliff, W. D.—Apparatus for Making Clay Retorts	96
Lack, P. J.—Valves	96
Applications for Letters Patent	97
Grants of Provisional Protection	97
Notices to Proceed	97
Patents which have passed the Great Seal	97
Patents which have become void	97
Share List of Metropolitan Gas and Water Companies	96

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

R.—*The mere fact stated by you would fail to carry conviction; but, if you will furnish us with full particulars as to the conditions, &c., under which the respective tests were made, we shall be happy to give publicity to them, and to the results.*

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 19, 1875.

Circular to Gas Companies.

With reference to the paragraph in our last "Circular," relating to the unused sites of the Chartered Company, we have been reminded of a fact, which had escaped our memory at the moment—viz., that the Curtain Road station was disposed of some long time ago. As regards the other stations, that at Brick Lane, it seems, has been in the market for some time, but does not command a sale. Perhaps the company are imitating the Corporation of London and the Metropolitan Board, and are asking too much money for their land. Negotiations, which promise soon to be completed, are, we learn, in progress for the sale of the Blackfriars site. All this is very satisfactory, as showing that the company are doing their best to realize the value of the unused property as fast as they can. The Horseferry Road will probably be devoted to the central storeage works, which, as we said last week, we regard as absolutely necessary for the company, and thus that valuable site must be retained. Enough money, however, it is clear, will be eventually realized, especially by the sale of the Blackfriars site, to give a sensible relief to the capital account of the company.

The Metropolitan Board of Works, we notice, have resolved to oppose the Bills of the Chartered and Phœnix Companies on Standing Orders. As regards the former, we shall be greatly astonished if any formality has been omitted which may cause its loss in this early stage. What can be the default of the Phœnix Company, we are at a loss to imagine.

The Brentford Gas Company have presented a memorial, complaining of non-compliance with Standing Orders, in the case of the Metropolis Gas Undertakings (Purchase) Bill.

The Corporation of Dublin are just now—or perhaps we should say, have been, for the matter has probably been settled by this time—in the same position as the Corporation of Ryde. Having neglected to pay the fees of the gas engineers they consulted, when promoting their abortive Purchase Bill, they have had four actions brought against them, to recover an aggregate sum of £1376. We notice, with some astonishment, that several members of the Corporation proposed to defend the actions—they may, perhaps, have relatives in the legal profession—but for the sake of the much-suffering ratepayers of Dublin, we hope that the good sense of the majority prevailed on Friday last, and that the accounts will be paid without incurring further law costs. The last thing the Dublin Corporation should think of is spending money in litigation.

The gas consumers of Birmingham have taken the course we suggested, and appointed a committee to consider the terms of the Corporation Gas Bill, a report to whom—which will be found in another column—is to be considered at a meeting to be held to-morrow. The consumers seem to realize the fact that they, as consumers, are not likely to be better off under the Corporation than under the companies, and, indeed, appear to entertain some suspicion that they may not be so well off. Some restrictions imposed on gas companies by the general Acts will not be applicable to the Corporation undertaking, and, practically, the only limitation to which the Corporation will be subjected, supposing their Bill to pass, is a limit of price, and the maximum is to remain the same as in one company's Act. We notice that this maximum (4s. per 1000 feet) is objected to by some, but, we think, without reason. The companies have never charged that price; but the cost of coal in the future is so uncertain, that it will be well for the Corporation to have a good margin. What the consumers ought to insist on is, that they should pay for gas, and gas only. They should flatly refuse to contribute to the proposed reserve-fund, of £100,000, which is intended to equalize the price of gas, and insist that gas shall be sold, like any other commodity, at a price regulated by the cost of production. Let us suppose that an advance of price will not be necessary for a good many years; what right have the consumers of to-day to pay a high charge, in order that another generation may have a supply under cost price? What with the interest on purchase-money, depreciation, insurance, and sinking-fund, all to be provided for, gas is certain to be dear enough in Birmingham; and if the consumers will take our advice, we recommend them to decline to contribute anything to a reserve-fund, or in aid of the borough rates, so long as the price of gas exceeds 2s. 6d. per 1000 feet. The Wednesbury Local Board appear to be satisfied with the assurances of the present Mayor of Birmingham, and we believe they may be; but Mr. Chamberlain will not always be mayor, and the out-districts ought certainly to look after their own interests.

Since the above was written, we have received a report of the proceedings at a meeting of the ratepayers of Walsall, at which it was resolved to oppose the Bill of the Corporation of Birmingham. A remarkable speech was made by the town-clerk of Walsall, who seems to think that the commissioners ought to obtain the gas plant in the district, which will presently belong to the Corporation of Birmingham, at the cost of old iron. We may take it as a fact, that the commissioners at Walsall have had an extraordinary success with their gas undertaking. They began on easy terms, and, no doubt, their works have been well managed. But their success last year does not seem to have been great, they having only a balance of £1700 to carry forward on revenue account.

The Corporation of Southampton appear to be badly advised as to the provisions of the Municipal Corporations (Borough Funds)

Act. They are promoting two Bills—one to legalize the purchase of the gas undertaking, the other to authorize competing works. Any expenditure of the ratepayers money in respect of the first of these Bills is legal, if the ratepayers express their consent at a public meeting; but any expenditure of public money in promoting the second is clearly illegal, and the Town Council must take the consequences of incurring it. When the time comes for the payment of the money, it will be open to any ratepayer to apply for an injunction, forbidding the application of the borough funds in defraying expenses incurred in promoting the competition Bill.

The excessively cold weather recently had its effect on the public gaslights all over the country. It is a very unfortunate thing, but until some other gas is discovered, extreme cold will always reduce illuminating power, and bring about choked pipes. Complaints are inevitable, but very often charges are made against gas companies which are altogether devoid of foundation. We select two cases as examples of a prevalent fallacy. At Chesterfield the Local Board seem to possess a brilliant genius, in the shape of a medical officer of health. At a recent meeting of the Board, he is reported to have delivered himself as follows:—"Any one, from looking at the gaslights, might reasonably infer "that they were paying for a considerable amount of atmospheric "air at the price of gas." At Truro, we fancy the gas company must have increased their exhausting power, and the result is thus described by a member of the Town Council:—"Ever since "the steam-engine was put up at the gas-works *to pump the air*, "the gas had not been so good. *The gas was pumped into the "retort before it came to its proper state.* Formerly the engine "worked slowly, but it was worked much faster since the "present manager came. That, for one thing, would account for "the bad quality of the gas." The gradual operation of the Education Act will, we have no doubt, prevent the utterance of much stump nonsense by members of Local Boards and Town Councils. Of any improvement in medical officers of health, our hopes are, at present, but small.

A curious point has been raised before the magistrates at Edmonton, but the law on the matter appears to us so clear that it is hardly worth discussion. The Tottenham and Edmonton Gas Company cut off a consumer's supply, under circumstances which will be found fully detailed in another column. The company were incorporated in 1859, and their special Act embodies the provisions of the Gas-Works Clauses Act, 1847. In the proceedings now referred to, the aggrieved consumer relied on the provisions of the Gas-Works Clauses Act, 1871, which, his advocate contended are also incorporated in the company's special Act. His contention was based on the declaration of section 1 of the Act of 1871, which says that this Act and that of 1847 are to be construed together as one Act. The ingenious gentleman passed over the qualifying provision of section 3 (1871), which says that the Act shall apply to every gas undertaking authorized by any special Act *hereafter passed*, and coolly asked the magistrates to believe that a company incorporated in 1859, who adopted voluntarily the general Act of 1847, are bound by the provisions of another Act passed 12 years later. Such an argument may be worth something when argued before the "great unpaid," but would, we imagine, provoke laughter in Westminster Hall. We need not go into the circumstances of this particular case. In our opinion, the legal position of the company was unassailable, and they behaved with liberality when they agreed to pay 5 per cent. interest on the deposit of £20 they demanded. We are glad that the case has been compromised, and hope that the parties will go on amicably. One thing, however, must be mentioned. The consumer puts the cost of lighting his premises with oil-lamps at £10 or £12 per week, and his gas bill is only £35 per year.

There is a dispute in the Middlesbrough Town Council as to the appropriation of £4000 gas profits. Some wish to apply the amount in aid of rates, whilst others would have it applied to a fund for fighting the Tees Conservancy Board and the water company. If used for the former purpose, it would allow of a reduction of the rates to the extent of 6d. in the pound, and gas consumers will not fail to remark the extra taxation they pay. The resolution was carried in the council, but we must express our decided opinion that the sum ought to have been applied in reduction of the price of gas.

Our readers have, no doubt, perused with much interest the papers and discussions on the manufacture of naphtha and petroleum gas, which we have borrowed from an American contemporary. At the present time there is nothing so likely to attract the attention of the gas world as a process which promises to cheapen the production of gas, and improve its illuminating power. Captain White professes to do both; but when we come to examine his statements, we find much that is vague, and miss many details which must be supplied before we can be satisfied of the achievement. In the first place, we may ask what Captain White means by naphtha? In this country we understand naphtha to mean the light products of the distillation of coal tar, and some remarks of the author here and there seem to indicate that he is dealing with the same oils or spirits. If so, we may dismiss this particular process from our minds at once; for, in Great Britain, these oils are of too much value to allow of their use in the production of cheap gas. Their employment will, however, account for the high illuminating power of Captain White's gas; but the frequent allusions to the alleged inexhaustibility of the petroleum reservoirs in the United States and Canada—which the discussion shows is not generally believed in, even in the States—seems to indicate that the advocates of the process under consideration propose to rely mainly on the lighter petroleum products for their carburetting medium. In this case it must be admitted that our American brethren have greatly the advantage over us. The prices stated are about one-half of those for which the same, or possibly heavier spirits, can be obtained here. It might be thought that the cost of coal, so much higher in American works than ours, would have a compensating influence; but then, as we have recently (vol. xxiv., p. 545) shown, the prices paid for gas in the United States are very much higher than can be obtained in this country.

Next, as regards Captain White's process, as to the nature of which we are left in some doubt. It would appear that the carburation of atmospheric air has been definitively abandoned, as it might well be. The American experimenters appear to be proceeding on the same lines, or nearly so, as Mr. Spice. They make a certain proportion of coal gas by the ordinary method, and they dilute this with—or, to speak, perhaps, more correctly, they add to it—a certain proportion of "water gas," carburetted with "naphtha," or petroleum spirit. The process appears to be somewhat different from that which, we understand, is employed by Mr. Spice, who passes his "water gas" through a "saturator," in which it becomes saturated with petroleum vapour. In America they seem (the account is by no means clear) to send petroleum vapour into a retort, heated, we presume, like the rest. Now, it requires something like a white heat to decompose petroleum vapour, and probably we are right in assuming that no decomposition takes place in this retort, and that the vapour passes along unchanged.

The daily winter consumption of the Citizens Gaslight Company is put down, at the lowest, as 800,000 feet, and this quantity of gas, according to Captain White, is produced by 14 benches of four retorts, with two of such benches for "water gas" and two for naphtha. Now, as these latter require next to no labour in their management, the saving of labour must be enormous; for, estimating the production of the coal gas-retorts at the maximum rate per mouthpiece, it would appear that the 16 naphtha and water gas-retorts must produce over half a million feet per day. This would seem to indicate a saving of at least one-half in labour, with a corresponding reduction in the fuel account.

We must leave the matter here, and wait with patience for the report by the committee of investigation appointed by the American Association. Taking, however, as we are bound to, the statements of Captain White, as expressing more or less the truth, we must say that the process advocated by him in America, and by Mr. Spice here, deserves the serious attention of gas producers.

Water and Sanitary Notes.

The Registrar-General has made an important addition to his weekly tables. He now gives the death-rate and birth-rate in what is called the "outer ring" of the metropolis—that is, the area beyond his previous limits, but included within the district of Sir Robert Peel's Metropolitan Police Act. This additional area includes 368,414 acres, and the population is rather more than two to the acre. Nothing is more certain than that density of population largely influences the death-rate; and the returns, as we get them, will, no doubt, be highly instructive. As a first instalment, we learn that the mortality in the week ending January 9, in inner London, with a population of nearly 46 to the acre, was 35 per 1000, while in the "outer ring" it was only 29 per 1000; and the statement is made, truthfully enough, that "at present the mortality is much the lowest in the 'outer ring.'" As regards density of population, there are statements repeated in these tables, week by week, which are distinctly misleading. Thus Leeds and Sheffield are said to have only 13 persons to an acre, and they have a high rate of mortality. Everybody who knows the towns is aware that parts of them are as densely populated as Liverpool; and, in the case of Sheffield, we believe that a considerable tract of moorland is included in the area of 19,651 acres, which never has and never will be built upon. These statements thus lead to false inferences, and it would be better to omit them.

Any one who has watched the general habits of the medical profession, will have observed a certain analogy with the conduct of a flock of sheep. As one of these pass along a highway, the

leader sees a straw or a puddle, and thereupon makes a jump, and all the rest of the flock who follow make a jump at or about the same spot. Typhoid fever is said to be propagated by the admission of sewer air to water-mains. A number of cases have occurred in Hull, and there a medical gentleman has lost no time in making a jump, and ascribing the prevalence of the disease to the access of sewer air to the water-mains, while the town was under an intermittent service. Dr. King neglects to account for the "imported case," but the omission we regard as of little importance. It is enough for us to put water companies on their guard, for, wherever typhoid fever appears, an attempt will be made to make them responsible for it.

Dr. Stevens's report on the outbreak at Over Darwen has been published; and if typhoid fever be the result of filth, there is quite sufficient in Over Darwen to account for the disease, without suggesting an apocryphal contamination of the water supply by the excreta from an imported case. The whole town reeks with filth, and the condition of things, as described by Dr. Stevens, is a disgrace to the age and country. It would be useless to say anything to such a Local Board as Over Darwen possesses. We may hazard a conjecture, and probably shall not be far from the truth when we guess that most of the members are landlords of small houses, to whom it is of little consequence if the inhabitants are poisoned, so long as rents are paid and rates are low. The Board got possession of the water-works from a company 13 years ago, with the view, we presume, of reducing the rates, and since then but little has been done to remedy the matters of which complaint was made against the company. Things have, in fact, been going from bad to worse; and now this outbreak is over, we have little doubt that the same neglect will prevail, unless the central authority can rouse the Local Board to a sense of their duty. Boards like that at Over Darwen bring disgrace on local self-government, and make its most ardent supporters sometimes desire an imperial despotism, or, at least, such enlarged area of jurisdiction as was suggested by Mr. Stansfeld, at Halifax, in the following paragraph from his important speech on sanitary matters:—

> One great thing is still wanting—the keystone of the arch—and that is the combination for certain wider purposes, or for certain common purposes, of these authorities, or their constituents, grouped together in some large natural area, giving a sense of strength, compactness, and individuality to the combined elements, standing, so to say, between them and the too attractive, too engrossing centralization of the day, and magnifying in the popular mind—but magnifying only to its fitting, though beyond its actual dimensions—the structure and functions of local self-government, by presenting it on a larger scale, and with higher and wider functions than have yet been accorded to it. And such would be the effect—not all at once, but in good time, in his conviction—of awarding to counties powers of municipal government such as those, *mutatis mutandis*, which have long been enjoyed by our more considerable towns.

We have no great love for counties; we are, in fact, progressive enough to wish to see them, with all our other present units of area, swept away. With all respect for Mr. Stansfeld, we do not regard a county as a "natural area." There is not one in the kingdom which can remain isolated, if ever adequate arrangements are made for drainage and water supply. Mr. Stansfeld should devote himself to a study of the Ordnance map, and distribute England into "natural areas," based on the principles of physical geography. That is one of the first steps to be taken for the real advancement of sanitary reform.

There is now a probability that the Town Councils of Newcastle and Gateshead will come to a common understanding as to the purchase of the water company's rights and the supply of the district. The usual fencing, of course, occurs; but, in the end, we believe that unanimity will be arrived at.

A press of matter obliges us to defer, until next week, any reference to the Birmingham Sanitary Conference, at which some notable addresses were made.

COLCHESTER GAS BILL.—At the meeting of the Colchester Town Council on the 6th, it was resolved to oppose the bill promoted by the gas company, and a committee was appointed to take charge of the opposition.

DEATH OF MR. CHARLES SMITH, OF LEEDS.—We have received intelligence of the sudden death, on the 15th inst., of Mr. Charles Smith, the engineer of the Leeds Corporation Gas-Works. Mr. Smith had been in the service of the Leeds Gaslight Company, and of the Leeds Corporation, for upwards of 43 years. He was a man of great practical experience as a gas engineer, and was much respected in a large circle of professional and private friends. The cause of death was heart disease. He was 64 years of age. His remains were interred yesterday at the Burmantofts Cemetery.

HAMILTON (N.B.) WATER SUPPLY.—It is estimated that the development of the mineral resources of the Hamilton district will result in doubling the population in the course of a few years. This prospective increase will necessitate an increased water supply. Since the introduction of the public water supply in May, 1857, nearly £3000 has been spent in the improvement of the works, and the additions contemplated by the proposed bill will, it is calculated, involve a further outlay of £6000. Powers are sought to construct a new reservoir near the source of Cadzow Burn, and an auxiliary one at Earsock, as well as to lay a conduit between Cadzow Burn and the existing reservoir, a distance of two miles. It is proposed to vest the management of the works, when reconstructed, entirely in the hands of the Town Council. There is at present a debt on the works of £11,200, and power is sought to borrow an additional sum of £8800, or £20,000 in all.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XLVII.

CHEMISTRY OF THE SCRUBBER.

Whilst speaking of the "Chemistry of the Scrubber," there are one or two methods of removing ammonia from gas, which should receive some attention, and a discussion of the views of Mr. Patterson on the subject of scrubbing and washing will likewise come consistently under the head of the present paper. It was formerly the custom to extract the ammonia from crude gas by means of a washer charged with dilute sulphuric acid, and although this method has now fallen into disuse, a process, somewhat analogous in its action, is still in use on some gas-works to a comparatively large extent. The process alluded to is that in which a small purifier, similar to that ordinarily in use, charged with sawdust, moistened with sulphuric acid, is used for the removal of ammonia. As the last-named method comes more properly under the head of the "Chemistry of the Purifiers" than under the present branch of our subject, it will only receive a passing allusion, by virtue of the chemical reactions which occur being similar to those taking place in the case of a washer simply charged with dilute sulphuric acid. The sulphuric acid acts by absorbing the whole of the ammonia present with formation of a corresponding amount of sulphate of ammonia. Although this method, as well as that in which sawdust moistened with the acid is used, eliminates the whole of the ammonia present, yet both are open to grave objections when relied on as the sole means of dealing with this impurity. When speaking on the subject of gas liquor, it will be remembered that special stress was laid on the value of this substance, *per se*, as a purifying agent; and it was shown that, when properly used, much of the sulphuretted hydrogen and carbonic acid in the crude gas could be removed by its means. By the use, however, of sulphuric acid as a means of purification, the ammonia alone is separated, the gaseous impurities with which it is associated passing on unaffected.

Not only does this occur, but any sulphide of ammonium or carbonate of ammonia which may be present in the gas, becomes at the same time entirely decomposed, the ammonia being retained by the sulphuric acid, whilst the gases with which it is combined become liberated in the free state, and have to be subsequently removed by the purifiers proper, thus causing an increase in labour and expense. It will thus be seen that the elimination of ammonia by this means is, upon theoretical grounds, entirely inadmissible, although there is no objection to the use of sulphuric acid as a means of removing any traces of ammonia which may remain in the gas after it has passed through the ordinary scrubbing and washing processes. For the latter purpose—that is, for removing all traces of ammonia—sawdust, moistened with sulphuric acid, is, in fact, not unfrequently used, more particularly among those companies under special Acts of Parliament, which render them liable to a severe penalty for the presence of ammonia in their gas in excess of the allowable quantity.

With regard to Mr. Patterson's views on "the sulphur question," and his special methods of gas purification, there is no doubt considerable credit due to that gentleman for the lucid and strictly scientific manner in which he deals with the whole question. It is hardly within the province of the present paper to deal with the much-disputed question of the priority which Mr. Patterson claims for his views, over those of others who have been working in the same direction, and it will suffice, therefore, to merely discuss his various schemes upon purely chemical grounds, giving more particular attention to his methods of washing and scrubbing with alkaline sulphides.

More extended trials of his inventions are necessary, in order to settle the question of the cost in comparison to that of exising methods of purification, more especially when the economy of revivifying "carbonated" liquids is entered into, for on this will, in a great measure, depend the ultimate success of his various schemes. It is presumed that the majority of the readers of this JOURNAL are all, more or less, acquainted with Mr. Patterson's views on the sulphur question; but, for the benefit of those not possessing an extensive knowledge on this subject, it will be better to give a short *résumé* of his various washing and scrubbing schemes, before entering upon the more complex question of the chemical changes involved. Mr. Patterson's inventions are mainly for dealing with the sulphur existing in crude gas in other forms than sulphuretted hydrogen, and to which the general term "sulphur" is applied. The "sulphur" is presumed to be present in the gas in the form of bisulphide of carbon (CS_2), and, from what is known of the subject, there is every reason to believe that this opinion is true. It has been found that when a lime purifier was used for some time, and its contents had become foul, that it was then, and not until then, capable of eliminating the sulphur, existing as bisulphide of carbon, from gas. This action has been traced to the sulphide of calcium present in the foul lime, and it is now known that the action is not peculiar to this special sulphide, but common to the alkaline sulphides generally. It has also been found that carbonic acid is capable of decomposing the various alkaline sulphides, with formation of carbonate and expulsion of sulphuretted hydrogen. The value of this peculiar property of carbonic acid will be more obvious when the chemistry of Mr. Patterson's views is more discussed. Referring to the second edition of his pamphlet on "Gas Purification," and in which he deals comprehensively with the whole question, it is found that the whole gist of his proposed methods for scrubbing and washing depends mainly *on the particular*

way in which he uses different alkaline sulphides, as well as on his taking advantage of the superior affinity of the alkalies generally for carbonic acid, over that which they possess for sulphuretted hydrogen. He recommends the more modern improvements of the washer as better adapted for his methods of treatment than any form of the scrubber, and points out that, by the ordinary way of using these vessels, they are quite useless in removing the bisulphide of carbon impurity, the amount of "sulphur" at the outlet often exceeds that found in the gas previous to its entrance. Berzelius showed, some time back, that bisulphide of carbon acted in some cases somewhat like an acidulous body, and was capable of forming combinations with the alkaline sulphides, which he termed "sulphocarbonates." These compounds are formed by the direct union of single equivalents of the bisulphide with an alkaline sulphide, and it is, without doubt, due to the formation of these combinations that the sulphides of calcium, sodium, and ammonium are found so efficacious in dealing with the "sulphur" impurity in ordinary gas. Mr. Patterson is of opinion that liquid sulphides—viz., those in solution, will be found to be more capable of dealing with "sulphur" in gas, than those in the more solid condition, such as sulphide of calcium as it exists in the ordinary purifiers, and, therefore, the use of the former in washers or scrubbers is preferable. He prefers using a series of four vessels, charged with either a solution of caustic soda, to start with, or with ordinary gas liquor. In the event of the former being used, the first change which occurs, on the passage of the crude gas, is the absorption of carbonic acid and sulphuretted hydrogen in about equal quantity, with consequent formation of carbonate of soda and sulphide of sodium.

Thus we have

$$2\,NaOHO + CO_2 + HS = NaS + NaOCO_2 + 3\,HO.$$

As the action proceeds, the contents of the first vessel become completely saturated with gaseous impurities, which now begin to pass on for absorption by number two vessel in the series; but, at this stage of the purifying process, the superior affinity of the soda for carbonic acid begins to be manifest, and a second change takes place. The carbonic acid, which is constantly entering with the crude gas, decomposes the alkaline sulphide present, with formation of carbonate, and expulsion of sulphuretted hydrogen, thus:

$$NaS + CO_2 + HO = NaOCO_2 + HO;$$

so that number one vessel will be dealing entirely with the carbonic acid, while, in consequence of nothing but sulphuretted hydrogen passing on to number two, the contents of that vessel become entirely converted into sulphide, in which form it is eminently fitted for dealing with the bisulphide of carbon impurity, with which the sulphide directly unites to form a sulphocarbonate, thus:

$$NaS + CS_2 = NaS,CS_2 \text{ (sulphocarbonate of sodium.)}$$

In using ordinary gas liquor for a similar purpose, the changes which occur are identically the same, differing only in the fact that the purifying material, in its crude state, is in this case already largely charged with gaseous impurities, and therefore not so concentrated in its action as when a comparatively pure purifying material, such as caustic soda, is used. Mr. Patterson proposes to use four vessels as a complete arrangement, assuming that the first two will deal with the carbonic acid, while number three contains only sulphide, for the removal of bisulphide of carbon, and number four is simply a reserve for arresting any sulphuretted hydrogen passing from number three. It is thus seen that the action goes on until numbers one and two in the series become completely "carbonated;" that is, until their contents are completely converted into carbonate, when they have to be thrown out, and replaced by others charged with fresh material. Part of Mr. Patterson's scheme is the revivifying—or "decarbonating," as he more strictly terms it—of the spent material. Whether this consists of carbonate of soda or ammonia, the residues from the use of caustic soda or gas liquor respectively, the process of revivification is mainly the same, and consists in the addition of caustic lime to the liquid, the action being assisted, in the case of soda, preferably by means of steam. The caustic lime, by reason of its superior affinity for carbonic acid, seizes hold of that substance, forming with it an insoluble carbonate of lime, while the corresponding alkalies, with which the carbonic acid was previously in combination, are liberated in the free state.

The following equations represent what occurs:—

$$NH_4\,O,CO_2 + CaOHO = CaOCO_2 + NH_4OHO.$$
$$NaOCO_2 + CaOHO = CaOCO_2 + NaOHO.$$

The first equation representing the "decarbonating" of carbonate of ammonia, and the second that of carbonate of soda. Whether this "decarbonating" will be successful in a commercial sense, is at present somewhat an open question, although, from its apparent simplicity, there is a strong presumption in its favour. It must not be forgotten, when dealing with the simultaneous removal of carbonic acid and bisulphide of carbon from gas, by means of alkaline sulphides, that unless *comparatively* concentrated solutions can be used, the full power of this system is not developed; and for this reason, if it is intended to make use of gas liquor, the strongest which can be obtained will be found the most efficacious in action.

Mr. Patterson's views on the causes of the extreme variation sometimes found in the amount of "sulphur" in gas, as well as the means of obviating such variations, will be treated of when we come to the chemistry of the purifiers. The exact analogy which exists between the action of *dry* lime and liquid scrubbing material, and the similarity of the chemical changes which occur, will likewise be then pointed out.

(To be continued.)

Correspondence.

FROZEN GAS-METERS.

Sir,—In the last number of your Journal there is a letter from Mr. Reid, the manager of the Edinburgh and Leith Gas Company, warning the consumers of gas there of the annoyance and inconvenience caused by their meters becoming frozen, whether they be wet or dry meters, and advising consumers to apply hot bricks or bags of hot sand to their meters.

Had the above observations applied only to wet meters, no exception need have been taken. Of course it is the freezing of the water in the wet meter which arrests its action. In the dry meter there is no water to freeze, and no arrest of its action can be caused by frost.

The application of hot bricks to dry meters would be liable to melt the solder of the cases, and occasion dangerous escapes of gas, and to injure and char the leather of the diaphragm, so as to render the meter useless until thoroughly repaired.

No doubt, in very exceptional cases, dry meters have been flooded from the gas-mains. This can only take place where the double error has been committed of connecting the service-pipe by tapping the gas-main in the lower part of its circumference, and placing the meter on a lower level than the main, so as to allow the water from the main to flow into the meter.

Small quantities of water may also condense in improperly laid fittings, and find its way into the meter at its outlet. Such errors as these are not likely to occur in large gas-works, under the careful supervision and able superintendence of such an experienced gas engineer as Mr. Reid.

Mr. Reid remarks that "frost cannot be dealt with and remedied promptly after it has got hold of the working parts of the meter." This, no doubt, applies exclusively to wet meters. The destructive influence of the expansive force of water in freezing is familiarly known by the bursting of water-pipes. The internal parts of wet meters are burst or warped by the same cause, and large quantities of gas pass through the internal opening unregistered. Every wet meter which has been frozen should be opened and thoroughly repaired before it is again used.

Ranelagh Road, Pimlico, Jan. 14, 1875. George Glover.

SCRUBBERS.

Sir,—Without expressing any opinion as to whether Messrs. Mann and Walker's scrubbers are better than other people's, or remove the whole of the ammonia at one stroke, might I suggest that some of those who use them, as well as those who use any of the ordinary sort, should send you, either under initial or number, particulars like those I have commenced? These will settle the matter with most people, as there is some pardonable doubt about the statements in newspaper articles and prospectuses, arising no doubt from the fact that somehow something a little better than the best experiments rushes into print, whilst the average ones, as well as the worst, with perhaps a pardonable modesty, seek the shade. As a beginning, I give you mine.

A Country Manager.

Scrubber No. 1.

1. Height, 15 feet.
2. Diameter, 5 feet 6 inches.
3. Filled with coke.
4. Ammoniacal liquor pumped over and over.
5. Goldsworthy Gurney's jet.
6. Gas dips once into the liquor at inlet.
7. Coals carbonized in twelve months, 1045 tons.
8. Liquor *sold*, 21,000 gallons.
9. Strength, 13½ ounces.
10. Liquor sold per ton, 20 gallons.

P.S.—This return would have been better had the pumping been continued during the summer months, and the liquor removed at suitable times in the winter months.

Parliamentary Intelligence.

GAS AND WATER BILLS, 1875.

Saturday, Jan. 9.

The following memorials, complaining of non-compliance with the Standing Orders, have been deposited in the Private Bill Office:—

Longwood Gas Bill from (1) John Burton, (2) John Taylor and Jane Kaye.

Metropolis Gas Undertakings (Purchase) Bill from Brentford Gas Company.

Blackburn Water Bill from Alfred Barrow and Alfred Sell.

Ballina Improvement Bill from Sir Charles Knox Gore, Bart., and others.

Cardiff Improvement Bill from Marquis of Bute and his trustees, John Boyle, and William Stuart, jun.

Saturday, Jan. 16.

Pemberton Local Board from (1) Thomas Melling and others, (2) Orrell Local Board.

Gaslight and Coke Company from Metropolitan Board of Works.

Middlesbrough (Corporation) Gas Supply.—It appears, from reports which have reached us, that about midnight of Saturday, the 9th inst., nearly the whole of the gaslights in the town of Middlesbrough were suddenly extinguished, much to the inconvenience and alarm of the inhabitants. The cause is at present unexplained; but at the meeting of the Town Council on the 12th, Mr. Dunning, in reply to inquiries, stated that the matter was being investigated. It was said that some main in the yard had sunk, and that the joints of the pipes had given way. He did not consider that as an excuse, and considered that there had been culpable negligence on the part of some of the workmen. He could only say that the matter would be thoroughly looked into, and care taken that such an occurrence should be rendered in the future, if not impossible, at any rate highly improbable. The Gas Committee have ordered their manager to prepare all necessary plans and specifications for a new tank and gasholder, and, in justification of this course, Mr. Dunning, at the Town Council meeting on the 12th, read an extract from the gas manager's report, which showed that the present gasholder capacity amounted to 520,000 cubic feet, while on Dec. 19 the make of gas amounted to 785,000 cubic feet. They therefore thought that there ought to be no delay in providing a new gasholder. It would take until October or November to finish it, and it was desirable that it should be proceeded with at once, because, in case of any accident happening, they might be placed in a very awkward fix.

Legal Intelligence.

EDMONTON PETTY SESSIONS.—MONDAY, JAN. 4, 1875.
(*Before* JAMES ABBISS, *Esq.*, *and* HENRY NASH, *Esq.*)

CLARK *v.* THE TOTTENHAM AND EDMONTON GAS COMPANY.

Mr. PHILP, solicitor, who appeared for the plaintiff, said this was a summons taken out under the provisions of the Gas-Works Clauses Act, 1871. The point raised was one of great importance, not only to the plaintiff and to the public generally, but also to the gas company who were the defendants, and no doubt an appeal would be made from the decision of this court whichever way it might be. As far as the plaintiff was concerned, the facts were very simple. Mr. Clark was the proprietor of the Red Lion, Tottenham, and had been since 1870 a consumer of gas supplied by the defendant company. The Tottenham and Edmonton Gas Company were incorporated in 1859, and the second section of their special Act incorporated the Companies Clauses Act, 1845, the Lands Clauses Act, 1845, and the Gas-Works Clauses Act, 1847. Under their Act the company were bound to supply gas upon certain terms, and with their Act was incorporated the Gas-Works Clauses Act Amendment Act, 1871, which provided how every gas company under its authority should be carried on. No doubt by the 11th section of this latter Act the company possessed power to cut off the supply of gas to a customer if certain things were not done. But, with regard to the question of security for payment of future gas accounts, the 16th section enacted that, in the event of a disagreement between a consumer and the company, the parties were bound to go before two justices of the peace, who were empowered to decide whether the security offered was sufficient to satisfy the demands of the company as they became due. It was left to the justices to decide whether the security should be by way of deposit or otherwise, and they had power to make the party who failed to sustain their case pay all the costs and expenses of the proceedings. By the 36th section of the same Act the company were liable to a penalty of 40s. for every day that gas was unlawfully kept from the premises of a consumer. Mr. Clark had been a consumer of the defendants gas under the Act which governed their transactions, but, in the month of November last, the company cut off the gas from his house, and from that time to the present he had been kept without a supply. It was almost impossible to carry on the business of a licensed victualler without gas in the bar, the coffee-room, the billiard-room, and other places frequented by customers. The comfort of people using a tavern must be studied, but comfort in a public-house could not be obtained when the gas was cut off. The company would, no doubt, allege that they gave the plaintiff notice of their intention to discontinue his supply, and he should leave them to prove it. He would call Mr. Clark to prove that he had been a consumer since 1870, and that, up to Sept. 30 last, he had paid everything due from him to the company, and that when the gas was cut off there was nothing owing. The company, therefore, were liable to the penalties mentioned in the 36th section, because, if not satisfied with the security offered to them by the plaintiff, they ought to have come before the justices for their decision under the terms of the 16th section.

Mr. *Frederic Clark*, examined by Mr. PHILP.

I am the proprietor and occupier of the Red Lion Inn, Tottenham. I went into possession in October, 1870, and from that time until Nov. 30, 1874, I was supplied with gas by the defendants. I cannot recollect whether there was a written contract, but I think I signed something at first. On the 30th of last November the gas was cut off. I had received notice of the intention of the company to cut it off, and on the 28th of that month I wrote to them saying that I had sprained my ankle, and the doctor said I must keep quiet, but giving them the names of gentlemen of affluence in the City of London who would be sureties for me for due payment of my accounts, and that if they wished it I would pay weekly or monthly. The gas company replied stating that they would take nothing less than a deposit of £20, and that if that amount was not paid by twelve o'clock they would cut the gas off They did cut it off.

Cross-examined by Mr. PULLEY (who appeared for the company): When I went into possession of the Red Lion in 1870, the gas was already laid on. It was not put on by my application. I was not then a weekly tenant of the house; I bought it, and paid £2100 for it. I was at one time a weekly tenant, while the lease was being drawn up; that was in 1870, and three years afterwards I was a weekly tenant for two or three weeks while the deeds were being drawn up. On one occasion, during the time the gas was supplied to me, the company applied for payment of their gas-rent, and received a cheque that was dishonoured. I asked them to hold the cheque over until the Monday, and they forgot to do it. I took it up afterwards. There was only one cheque dishonoured. There was a cheque lost once, but I had had a receipt from the collector.

Mr. PULLEY: You say that on the 30th of November the company cut off the supply of gas. Now, up to that time had you ever paid anything to the company for gas?

Witness: Yes, certainly.

Mr. PULLEY: Was not the gas supplied under a written guarantee from Messrs. Hudson, Mathews, and Co.?

Witness: I am not aware of any written guarantee. They paid one account for me; I gave them a cheque for it, which they sent to the company. I have myself paid every account since. The company always applied to me, that I swear. The quarterly applications for payment were never made to Messrs. Hudson and Mathews, they were always in my name. It was true that I had sprained my ankle when I wrote to the company; it was not a subterfuge. I do not know the precise date when the company gave me notice they should require a deposit. I have never applied to them to be supplied with gas. It was laid on when I took possession. I do not know whether any contract had been entered into previously.

Re-examined by Mr. PHILP: I have always paid for the gas consumed, out of my own pocket. The first I heard from the company about the gas was when they wanted me to lend them £20.

Mr. ABBISS: Do not say lend—it was to be a deposit.

By Mr. PHILP: The inspector came round every quarter to examine the meter, and left a ticket. I have not one of those tickets with me. The application for payment was always made in the ordinary way to me, and I always paid the accounts. The names I gave as sureties were *bond fide* names of people able to pay any amount for gas. If the company had wanted them, I would have given them the names of my brewers.

Mr. PHILP: That is my case.

Mr. PULLEY, in defence, said this was an application under the Gas-Works Clauses Act, 1871, and the 16th section of that Act had been imported into it. Of that he should speak further on. He did not care what might have been the dealings between the company and Mr. Clark prior to November last; his defence was the 11th section of the Act of 1871. It was admitted that application had been made by the company to the plaintiff for a deposit, and it was also admitted that plaintiff in reply gave the names of certain persons as sureties, instead of making, what in a pleasant way he called, a loan to the company. No doubt the company had every discretion under the terms of the 11th section. He should be prepared to show that they had acted strictly in accordance with that section, and that on their part there had been no want of consideration towards Mr. Clark. The 11th section stated that "every owner or occupier of premises requiring a supply of gas shall give to the undertakers, if required by them so to do, security for the payment to them of all moneys which may become due to them by such owner or occupier in respect of any pipe to be furnished by the undertakers, and in respect of gas to be supplied by them; provided always that the undertakers may, after they have given a supply of gas for any premises, by notice in writing require the owner or occupier of such premises, within seven days after the date of the service of such notice, to give to them security for the payment of all moneys which may from time to time become due to them in respect of such supply, in case such owner or occupier has not already given such security, or in case any security given has become invalid, or is insufficient; and in case any such owner or occupier fails to comply with the terms of such notice, the undertakers may, if they please, discontinue to supply gas for such premises so long as such failure continues." Now, in this case, what did the company do? He (Mr. Pulley) would prove, in answer to the summons, that they gave the seven days notice mentioned in the section, and that Mr. Clark was informed that unless he complied with the terms of the notice, the gas would be cut off on the 30th of November. In cutting it off on that day, the company simply did what their notice stated they intended to do. The company could not be shackled and bound down to do what the plaintiff wished them. They rejected his proposed sureties because they did not consider them sufficient, and preferred to have a £20 deposit. They were entitled to it. It was not given, and Mr. Clark had no right to complain of what they subsequently did. He had brought any inconvenience that had arisen, upon himself. Why did he not pay the deposit? If the plaintiff relied upon the 16th section, he (Mr. Pulley) would tell him the company had no power to act under it. That section stated that "where any owner or occupier is required by the special Act to give security," they must, in case of default of agreement, go before two justices to decide the nature of the security. The company had not proceeded under a special Act.

Mr. PHILP said the 5th section of the special Act of the company enacted that they should carry on their undertaking "according to the provisions of this Act and of the Acts herewith incorporated." The Acts "herewith incorporated" required that sureties might be given, and the company could not refuse them.

Mr. PULLEY said that would be a question for the bench to decide. His point was that it was not necessary the company should come before the justices under the 16th section. They did not care a dump whether Mr. Clark had their gas or not, and they were not disposed to do just as he desired. They were not bound to give their gas away, and in acting as they had done they had kept themselves within the four corners of the 11th section. If he satisfied the bench on this point, they would have no hesitation in giving a decision in favour of the defendants.

Mr. *James Randall*, examined by Mr. PULLEY.

I am the secretary of the Tottenham and Edmonton Gas Company. Prior to the 18th of December last, gas was supplied by us to the Red Lion, under an agreement in writing. It was in the nature of a guarantee. I have not the guarantee here. I believe it is at the office, but you have the withdrawal of it. Until the 6th of October, 1874, the gas accounts, as they became due, were paid by Messrs. Hudson, Mathews, and Co., under their arrangement. The amount then due was £7 2s. 3d. Applications for payment were always made at the house. The notices, quarter by quarter, were always written by me, and were made out in the names of Messrs. Hudson, Mathews, and Co., and the receipts were given in the same names.

Mr. ABBISS: I presume the point Mr. Pulley is raising is that, although Mr. Clark was a consumer, he was not a customer.

Mr. PHILP: He must prove that in a proper manner, and not thrust down our throats the contents of a document which is not before the court.

Witness: On the 18th of September last I received a letter from Messrs. Hudson, Mathews, and Co. about the Red Lion gas.

Mr. PULLEY: I propose to read it.

Mr. PHILP objected, on the ground that the original agreement to which the letter referred had not been produced, and

The BENCH allowed the objection.

Mr. PHILP: It does not matter with whom the contract is made; the Act distinctly states that the company are bound to deal with "the owner or occupier" of premises.

Mr. PULLEY: And the company may select to have a "deposit or otherwise," and the company were not satisfied with the "otherwise" in this case.

Mr. PHILP: I have clearly proved that Mr. Clark is the occupier of the house, and that therefore the company have acted illegally in cutting off his gas.

Mr. ABBISS: I cannot see how your case is benefited by the occupation being proved, when the security required has not been given.

Mr. PHILP: We have not failed within the meaning of the 11th section. The company have no right to refuse the sureties offered. The only power they possess is to come to the justices, that they may decide what security shall be given.

Mr. PULLEY: Then you should have brought us here under the 16th section.

Mr. PHILP: If it can be shown that they have the power to refuse the sureties offered, I will withdraw the summons, but I know they have no such power. They have a monopoly to supply the district with gas, and power to ask for sureties, but they have none to refuse what is offered. If they are not satisfied, they must come before the justices.

Examination of Mr. *Randall* continued: In consequence of something that happened on the 18th of November last, I wrote the following letter to the plaintiff:—

Gas-Works, Tottenham, Nov. 18, 1874.

Sir,—As Messrs. Hudson, Mathews, and Co. have withdrawn the guarantee for the payment of your gas accounts, I am instructed by the board of directors to inform you that they will require a deposit of £20 as security for payment of future gas accounts. Provided that the quarterly accounts presented from time to time are paid promptly when applied for by the collector, interest at the rate of £5 per cent. per annum will be allowed quarterly, as long as the board of directors may hold possession of the said deposit.

I respectfully request you will forward the deposit of £20 to this office on or before Friday, the 27th inst., otherwise the supply of gas will be discontinued. Awaiting reply, I am, &c., (Signed) JAMES RANDALL, Secretary.

Mr. Frederic Clark, "Red Lion," Tottenham.

On the 24th of November I received this answer—

The "Red Lion," Tottenham, Nov. 24, 1874.

Dear Sir,—I understand your board meets on Saturday next, and I will call upon you on that day at ten o'clock. In the meantime, I presume you will not do anything in respect of your letter of the 18th inst. (Signed) FREDERIC CLARK.

To James Randall, Esq.

The next letter I received was the one in which the plaintiff speaks about spraining his ankle, and gives certain names as sureties. I replied to that as follows:—

Gas-Works, Tottenham, Nov. 28, 1874.

Sir,—In reply to your letter, I am instructed by the board to inform you that they decline to accept any of the names offered as security for payment of gas accounts, and to state that unless the amount of deposit, £20, is paid by Monday next, the 30th inst., by twelve o'clock mid-day, the terms of their former letter will have to be carried out.

Mr. Frederic Clark, "Red Lion." (Signed) JAMES RANDALL, Secretary.

On the 28th I received the following letter from the plaintiff:—

The "Red Lion," Tottenham, Nov. 28, 1874.

Gentlemen,—I am duly in receipt of yours of this date, and, acting under advice, beg to state that if you carry out your threat, I shall hold you liable for all loss of trade and injury I may sustain. (Signed) FREDERIC CLARK.

To the Edmonton and Tottenham Gaslight Company.

Mr. PHILP: I admit everything that followed. The gas was cut off——

Mr. PULLEY: In accordance with the notice given, such notice being in strict compliance with the provisions of the Act of Parliament.

Mr. PHILP (to witness): You have sworn that the gas accounts were paid by Messrs. Hudson, Mathews, and Co.

Witness: I have.

Mr. PHILP: Now look at these cheques.

Witness: You produce the receipts that were given for the accounts.

Mr. PHILP: We will come to that directly. Whose name is on the back of those cheques?

Witness: Produce the receipts that were given for them.

Mr. ABBISS: This is the point, I suppose. Mr. Clark gave his cheques for the accounts, but the receipts were made out to Messrs. Hudson, Mathews, and Co.

Witness: The receipts were always made out to them. I don't know where the money came from. The cheques were drawn by Mr. Clark.

Mr. ABBISS: Messrs. Hudson, Mathews, and Co. gave a guarantee for payment of the accounts, and under that guarantee the bills were made out to them, and when the money was paid the receipts were also made out to them. Is that it?

Witness: It is; and I may say that when we gave notice to Mr. Clark of payments due, we also, out of courtesy, sent a copy to Messrs. Hudson, Mathews, and Co.

Mr. PHILP called for the production of the company's books, showing the names and accounts of the consumers.

Mr. ABBISS: I do not think anything hinges on the manner in which the accounts are entered. As far as my judgment goes, and I have no hesitation in stating it at once, whether the account is entered in the names of Hudson and Mathews, or of Mr. Clark, I am of opinion that, in case of dispute or disagreement respecting sureties for future payments, it was the duty of the person aggrieved to come here; and the person aggrieved not having come as he might have come, has no right now to complain against the company for not coming.

Mr. PHILP: Mr. Clark has a legal right to complain.

Mr. ABBISS: Under the 16th section application to the justices may be made by either party. Why, then, when the company refused to take the surety offered, if you felt aggrieved, did you not come here, that we might have decided whether the surety was sufficient?

Mr. PHILP: The company must keep within the four corners of their own Act. If they show me that they can refuse sureties when offered, I repeat that I will withdraw the summons. But I say that they cannot refuse, and that they have no right to ask for a deposit of £20, or any other sum. Look at the sub-section of the 11th clause. Where can you discover that the company have power to say, "Pay £20 into our pockets as long as you keep the house. We will be your bankers for £20." The Act says nothing of the kind. All it confers upon the company is the right to ask for sureties which they cannot refuse to accept.

Mr. ABBISS: Not if they consider them insufficient? Why, it would be monstrous to compel a company to accept A., B., or C., whom they might know to be worthless as sureties.

Mr. PHILP: The company must come here to test their sufficiency.

Mr. ABBISS: You must bring them here to show cause why they refuse to accept them.

Mr. PHILP: No Act gives the company power to cut off the supply of gas until they have been before the justices to test the surety offered. They have a monopoly in their hands, and for reasons of their own might refuse a Rothschild if offered.

Mr. ABBISS: That would be a matter for the justices to consider when the person aggrieved brought the company before them.

Cross-examination of Mr. *Randall* continued: We always regarded Messrs. Hudson, Mathews, and Co. in the light of our consumers, but as I said before, I cannot tell whence the money to settle the accounts came. They were paid by Mr. Clark's cheques, but where the money came from to meet those cheques I do not know.

Mr. ABBISS: There is no difficulty in answering that. The cheques were drawn by Mr. Clark, and were to pay the accounts made out to Messrs. Hudson, Mathews, and Co.

Mr. *T. W. Kilsby*, examined by Mr. PULLEY.

I am a collector of gas-rents for the company. For the two quarters ending the 29th of September last I made application for payment for the gas supplied to the Red Lion. The accounts were made out to Hudson, Mathews, and Co., and the receipts were given in the same name, and never in the name of Mr. Clark.

Cross-examined by Mr. PHILP: The cheque produced is drawn by the plaintiff, and was received at the office. I applied four times every quarter for payment, but never received the money. It was paid to the office, and the receipt obtained from thence. I sent a copy of the accounts delivered at the Red Lion to Messrs. Hudson, Mathews, and Co.

Mr. *C. P. Caine*, examined by Mr. PULLEY.

I am the inspector of the company, and produce the meter-book, in which the state of the meter at the Red Lion is entered. The counterfoil is an exact copy of the demand note left with the plaintiff. It is not made out in the name of Clark, but of Hudson, Mathews, and Co.

Cross-examined by Mr. PHILP: For the last four quarters the notes have been made out in that way. Before then they were made out to Mr. Clark.

Mr. PULLEY said this was his case, and he submitted that the company had complied with their notice, and with the terms of the 11th section, in cutting off the gas.

Mr. PHILP said the 11th section enacted that—"The undertakers may, after hey have given a supply of gas for any premises"—which had been conclusively proved—"by notice in writing, require the owner or occupier"—which the had shown Mr. Clark to be—"to give security, in case such owner or occupier has not already given such security"—it might be taken for granted that Mr. Clark had not given any security—"or in case any security is insufficient"—as Messrs. Hudson and Mathews had withdrawn their guarantee, their security had become insufficient. But it could not be said that Mr. Clark's security was insufficient, because, when he received the notice, the company had not been furnished with the names of the proposed sureties. The notice was given because Messrs. Hudson, Mathews, and Co. had withdrawn or become insufficient; and, as they did not know even the names of the sureties Mr. Clark intended to propose, they could not allege that these were insufficient. When the security is insufficient, the company were entitled to give a notice. What notice did they give? Not for the "security," which the Act permitted, but for a deposit of £20. They had no power to do anything of the kind.

Mr. PULLEY said the 16th section provided that the security might be "by deposit or otherwise."

Mr. PHILP said the 11th section was quite explicit, and the company were bound to accept the sureties offered or to come before the justices for their decision as to their sufficiency, and the justices, if proper names had not been given, could make the plaintiff pay all the costs of the application. The company of themselves had no power to refuse the names offered, but they possessed a monopoly which they sought to use in an arbitrary manner. They cut off a consumer's gas illegally, thereby nearly ruining him in his business. The penalty for this was fixed by the 36th section, and if the magistrates agreed with him in his view of the company's conduct, he hoped they would inflict the full penalty. Mr. Clark had to shut up his house for several days, and had had to incur immense expense to light his premises with oil lamps to enable him to carry on his business.

The magistrates retired to consider the case, and on their return,

Mr. ABBISS said: This is a very important case, both as regards the gas company and the consumer. We have looked very carefully through both these sections. (Read secs. 11 and 16.) Well, now in this case it appears to us that the proper course would have been, in the event of the consumer not being satisfied with the company demanding a deposit, to summon the company here, to show cause why they refused to accept the security tendered, and it would have been for the justices to settle whether the security offered was sufficient. The consumer, however, did not summon the company to show cause why they declined the security offered, and by not doing so, he has not put himself in a position to have it ascertained whether it was sufficient or not. We, therefore, think that this summons should be dismissed, leaving it to the consumer, if he thinks fit, to take the steps which will enable us to decide whether deposit or security is right for the company to require.

Mr. PHILP gave notice of appeal, and, acting also on the hint thrown out by the bench, applied for a fresh summons under the 16th section.

Mr. PULLEY applied for costs.

Mr. ABBISS: We think it a case in which each side should pay their own costs.

Summons dismissed.

MONDAY, JAN. 11.

The summons applied for by Mr. Philp, at the last sitting of the court, came on for hearing this morning.

Mr. PHILP again appeared for the plaintiff, Mr. Clark; Mr. DOUGLAS STRAIGHT, instructed by Mr. Pulley, represented the Edmonton Gas Company.

On the case being called,

Mr. STRAIGHT said: For the present moment, not taking any exception to the form of the summons, he had to submit to the bench that the statute under which it was taken out (the Gas-Works Clauses Act, 1871) did not apply to the defendant company, and that, therefore, the magistrates had no jurisdiction in the matter. He might state that the very point at issue between the parties had recently been reserved, by one of the magistrates of the metropolitan police district, for the consideration of the Court of Common Pleas. He would, in a few words, explain what the point was. The bench was aware that in all Acts of Parliament now passed, and in all Provisional Orders now granted to gas companies, the provisions of the Gas-Works Clauses Act, 1847 (10 Vict., cap. 15), and the Gas-Works Clauses Act, 1871, were always incorporated. The special Act of the Tottenham and Edmonton Gas Company was passed in 1859, and there was no doubt the Gas-Works Clauses Act, 1847, was incorporated with it; but it must be plain that, having been established in 1859, the provisions of the Act of 1871 could not apply to it. The third section of this latter Act stated that "the provisions of this Act shall apply to every gas undertaking authorized by any special Act hereafter passed, or by any Provisional Order made under the authority of the Gas and Water Works Facilities Act, 1870"—not any gas undertaking authorized beforehand, but "hereafter." It was upon this very point that the learned magistrate at the Worship Street Police Court would state a case for the opinion of the Common Pleas—viz., whether the statute applied to any gas undertaking in existence before the passing of the Act. This Act of 1871 made it compulsory upon all gas companies seeking a special Act that they should incorporate its provisions and the provisions of the Act of 1847. When the Tottenham and Edmonton Company came into existence, it was optional on their part whether they should incorporate the Act of 1847, but, having done so, it surely could not now be held that they also incorporated the provisions of an Act passed more than 20 years afterwards. And it certainly could not be pleaded as a hardship and a grievance that the company had such power in their hands, because from 1847 to 1871 all gas companies beyond the metropolis were regulated by the provisions of the 1847 Act, if they thought fit to incorporate it. It was obvious that, until the Act of 1871 the relations existing between gas companies and their consumers were in the nature of contracts. It was perfectly true that certain power was given to the gas companies by the 16th section of the Act of 1847, by which, when the amount due from any consumer was under £20, the company could cut off the gas, and apply to the justices to recover the rent and the expenses of cutting off the gas; otherwise there was no provision down to the Act of 1871, which regulated the relations of the gas company and the consumer; but they were left in the position of persons having contracts with one another, and the magistrates could not give a retrospective force to the Act of 1871 so as to make it apply to a company which in 1859 incorporated in their special Act the provisions of the 1847 Act. In the Worship Street case, to which he had referred, the Commercial Gas Company were summoned under the Metropolis Gas Act, 1860 (which did not apply to the jurisdiction of the bench), for discontinuing the supply of gas to a consumer without notice. Curiously enough the prosecution proceeded under a wrong section—viz., the 21st, which simply rendered illegal certain conditions which a gas company might be disposed to put in any contract with a consumer—*i. e.*, that no contract should be binding between the company and the consumer in which the company were entitled, except for breach of any of the provisions of that Act, to discontinue the supply of gas on less than one month's notice, unless the rent was in arrear. The question which thereupon arose was this—Was the gas-rent in arrear? That summons was ultimately amended, and the proceedings taken under the 36th section of the Act of 1871, under which section a summons had been heard before in this court at the instance of Mr. Clark. But he (Mr. Straight) contended that the 36th section did not apply at all. In the present case, he submitted that there was no provision in the statute incorporating the Tottenham and Edmonton Gas Company which regulated the conditions of supply, and that it was simply a matter of contract between the company and the consumer. The summons was taken out under the 16th section of the Gas-Works Clauses Act, 1871, which said, "Whenever the undertakers neglect or refuse to give a supply of gas to any owner or occupier of premises within the limits of the special Act entitled to the same, under such pressure; as is prescribed, they shall be liable to a penalty not exceeding 40s. for each day during which such default continues." What did these words mean? They meant, if the company neglected or refused to give the requisite pressure; it was not a neglecting or refusing to supply gas; that was a matter left, as it was before, under the Act of 1847. But his contention was that the terms of the 3rd section of the Act of 1871, which said the Act should only apply to companies "authorized by any special Act hereafter passed," gave the bench no jurisdiction over the defendants; and if the magistrates should be disposed to think they had jurisdiction, he would submit that as the point had been raised in another case, and was likely soon to come before the superior court for judgment, the present summons should stand adjourned.

Mr. ABBISS asked whether he understood the learned counsel that the statute to which he had referred released the company from a binding engagement under their own Act.

Mr. STRAIGHT said what he contended for was this—the summons purported to be taken out under the 16th section of the Act of 1871, and as such it was wrongly taken out, because the Act did not apply to the company at all. He objected to the company being considered as affected by the Act of 1871. There was nothing in the Act of 1847 relating to the giving of security; it occurred first of all in the Act of 1871.

Mr. PHILP said the objection to the summons was entirely a technical one—viz., that under the 3rd section of the Act of 1871, the magistrates had no power to decide the question at issue between the parties, the company being incorporated only under the Act of 1847. On the other hand, his contention would be that by the 1st section of the Act of 1871 his client was entitled to

the benefit of all the provisions of the Act. The 1st section said, "The Gas-Works Clauses Act, 1847, and this Act shall be construed together as one Act"—that meant that the two Acts were to be read as one—"and the provisions of this Act shall be held to repeal and supersede such of the provisions of that Act as are inconsistent with this Act." He (Mr. Philp) therefore contended that he was entitled to all the benefit of the Act of 1871. With regard to the importance of the question, he might say that the present state of things was ruination to his client, who was now spending £10 or £12 a week on oil lamps through the act of the company in cutting off his gas. He must, therefore, press upon the magistrates the necessity of deciding at once whether his client was to find sureties or to pay down a sum of money, so that he might have the gas laid on again.

Mr. ABBISS asked whether he understood Mr. Straight to contend that the court had no jurisdiction.

Mr. STRAIGHT said that was his contention, on the ground that the summons had been wrongly taken out, and therefore the case was *coram non judice*. With regard to the remark made by Mr. Philp, he had never contended that the Act of 1871 was not to be read as one with the Act of 1847 from and after the time of the passing of the later Act. What he contended was that it could not be applicable to a company already incorporated under the Act of 1847. It would be exceedingly hard to force a company to come under the provisions of an Act which was not in existence till upwards of 20 years after its incorporation.

Mr. ABBISS: Would it be hard?

Mr. STRAIGHT: I say it would.

Mr. PHILP: It is much harder upon the consumer.

Mr. STRAIGHT: How can you give effect to a statute in this way, and incorporate it in a previous Act?

Mr. PHILP: The second clause of your special Act says: "The Gas-Works Clauses Act, 1847, shall be incorporated herewith," and the first section of the Gas-Works Clauses Act, 1871, says: "This Act and the Act of 1847 shall be construed together as one Act."

Mr. STRAIGHT: But by clause 3 of the Act of 1871 it is enacted that "the provisions of this Act shall apply to every gas undertaking authorized by any special Act *hereafter* passed." I am quite aware of the difficulty in which this view of the matter places me. As far as I am concerned, I say the company had no right to ask for security at all.

Mr. PHILP: I take it that the learned counsel will concede that if I am not entitled to proceed under this Act of Parliament, his company have acted not only in the most arbitrary manner, but also illegally, and that they were not entitled at common law to cut off the gas when there was nothing due. If he will concede that to me I will withdraw the summons.

Mr. STRAIGHT: I am here on the part of the company to argue the case, but I do not wish the bench to give judgment upon a point that is not within the terms of the statute. I am perfectly aware of the difficulty my company are in if my contention is a good one.

Mr. ABBISS: Would it not be better to arrange this matter. I presume all the plaintiff wants is to have his gas.

Mr. PHILP: And to be paid for the loss he has sustained since the 28th of November.

Mr. ABBISS: I apprehend every seller of an article would be glad to sell if he was sure that he would be paid for what he sells.

Mr. STRAIGHT: I think it would be very convenient if this matter were adjourned for a week. I have intimated a certain view to Mr. Pulley, and I have no doubt an arrangement can be come to.

Mr. ABBISS: How will you do about the gas in the meantime?

Mr. STRAIGHT: I am anxious the man should have his gas.

Mr. PHILP: Mr. Straight may be, but are the company?

Mr. STRAIGHT: Do not abuse the company. It is very easy, when you have no case, to abuse the other side. If any suggestion can be made, I shall be most glad. I have intimated to Mr. Pulley that in my judgment upon this statute—at any rate for the present, in the questionable condition of things—it is very desirable that the company should accept reasonable security, and not require a deposit of money.

Mr. ABBISS: I think that would be satisfactory. What is the consumption of gas?

Mr. PHILP: About £35 a year.

Mr. STRAIGHT: I may be utterly wrong in the view I take of this statute, but it seems to me that the matter is in such a transition state that, without prejudice to any one's rights, this summons had better be adjourned.

Mr. ABBISS: I think the parties had better retire into a private room, and settle it between themselves.

The suggestion of the bench was adopted, and on the parties again coming into court, it was stated that the matter had been arranged, and the summons would be withdrawn.

CORK POLICE COURT.—SATURDAY, JAN. 2, 1875.

(*Before Messrs.* N. DUNSCOMBE, R. PERROTT, *and* W. R. STARKIE, R.M.)

CONVICTION OF STOKERS FOR UNLAWFULLY LEAVING WORK.

Eight men named *John Ahearn*, *John Murphy*, *John Donovan*, *Michael M'Carthy*, *Thomas Murphy*, *Jeremiah Lynch*, *James Regan*, and *James M'Carthy*, stokers in the employment of the Cork Gas Company, were charged under the 9th section of the Masters and Servants Act, 1867, with absenting themselves from their work on or about the 26th of December, without reasonable cause, thereby causing damage to the company, which could not be estimated or assessed.

Mr. M. J. HORGAN appeared on the part of the company, and Mr. J. T. O'CONNELL was for the defendants.

The case for the prosecution was that about the middle of November the stokers applied in a body for an advance of 8d. per day in their wages, they then being in receipt of from 29s. to 32s. per week. The manager (Mr. Travers) placed their demand before the directors, who, considering the position of the company, and the continued practices of the defendants in making like demands, always on occasions when their services could not be dispensed with, determined to resist, and declined to grant it. Their original wages being only 16s. per week, are now raised to about 30s. by their previous demands, and at no time was any reduction made. From the time the directors refused to comply with their request to Christmas Day, the defendants showed a disinclination to perform the work properly, allowing the fires to go down, and either not charging the retorts or charging them improperly. This spirit necessitated the perpetual supervision of the manager. On Christmas Eve the company gave a gratuity of 10s. to over 50 of them, in addition to their wages. On Christmas Day the defendants were in the day-gang, whose duty consists in keeping the fires well up and their retorts charged, and to hand them over in proper condition to the night gang at six in the evening. Instead of doing so, they left the retorts improperly charged, and allowed the fires to go down, causing thereby a falling off in the production to the extent of over 100,000 feet of gas. On St. Stephen's morning the defendants again returned, and were at work only for about an hour when they showed an insubordinate disposition. They refused to put on the lids of the retorts without additional help, which was given to them. The manager went to breakfast at nine o'clock and on returning at half-past found that the defeadants had left work in a body. To keep up the supply of gas it is necessary to draw and charge some of the retorts every hour; therefore from half-past nine to half-past ten the retorts worked by defendants were undrawn. The manager got together all the available hands at the works, and put them in defendants places, and ever since, notwithstanding that an extra number of men are employed, and extra retorts charged, we were unable to make good the loss caused by defendants conduct. The loss on that day was over 150,000 feet. Ever since, the supply to the city was with difficulty maintained. After an absence of about five hours, defendants returned as they left, in a body, and on finding other men shoved into their places, one of the defendants, James M'Carthy, cried out to the new men, "You are no men," and taking off his coat said, "I will fight any one of you," but on seeing the manager he went off. They then came in a body and asked the manager if they would be allowed to resume work, which he refused. From the time they left the works until they returned, sufficient time elapsed to leave the city in utter darkness, had not the manager acted as he did in getting new men to keep the retorts charged. Defendants were the principal firemen employed.

Mr. TRAVERS, the manager, deposed to the above-stated facts. In reply to Mr. O'Connell, he said the supply that night was equal to the demand, but it was owing to the assistance of the new hands that it was maintained. He denied that the men were refused meal-water, which was allowed to men engaged in this description of work. They were never supposed to leave the works during business hours.

Denis Mullins, the foreman night stoker, deposed to the condition in which the defendants left the fires and retorts. In cross-examination he said that this was not the first time the retorts and fires were in a bad condition. They were often bad before, and it was not the first time the supply of gas was deficient. The going down of the fires may be caused by the default of the firemen, and the defendants were not firemen.

Mr. O'CONNELL said the defence was this: The men did not deny that they left their work on the day in question, and he thought the company should make some allowance for a festive occasion of the kind. They could prove that when they offered to resume work there was plenty of time to make up for any loss if any occurred, and they disputed the fact. He argued that there was no agreement between the men and the company as to the notice they should give before leaving—whether an hour, a day, or a week's notice, and that there was, therefore, no offence in the men's conduct. He submitted that no case was made out to justify punishment, and that ample amendment was made for whatever was wrong by the men expressing their regret for what they had done.

Mr. DUNSCOMBE said the bench were of opinion that a case had been made out, and recommended Mr. O'Connell to call his witnesses.

Jeremiah Ahearn was called, and said that the men left quietly to get some refreshment, as no meal-water had been supplied to them for three weeks before Christmas; they worked extra time, which he estimated at worth 10s. a day, but they received no consideration from the company, except a Christmas-box of 10s. At the time they retired they could have made up in a couple of hours any deficiency there was.

On cross-examination by Mr. HORGAN, *witness* said he was never refused the meal-water, but when he asked for it he did not get it. He was aware there was a rule prohibiting the men from leaving the gas-works during business hours.

This closed the case.

The magistrates retired, and after some deliberation,

Mr. DUNSCOMBE said they had given the case close examination, and he was happy to say their decision was unanimous. They were of opinion that very serious consequences would have resulted if Mr. Travers had not acted with great energy and determination, and supplied the places of those who, in a body, had left their work. It was terrible to contemplate the serious consequences of leaving a city like Cork in darkness for even one night. He did not like to turn such a contingency in his mind. The bench had the power to fine these men very severely—as much as £20—but taking all the circumstances of the case into consideration, they had determined upon fining them £3 each, and in default a month's imprisonment. He thought it right to add that from the evidence it appeared that the gas company had acted very fairly to the men in their employment.

Mr. O'CONNELL asked the magistrates to give the defendants the option of appeal.

Mr. STARKIE said they could not do so under the 9th section, and they did not take "aggravated misconduct" (which was the offence under the 14th section) into consideration at all. There was no appeal under the 9th section.

The conviction was then recorded, the defendants getting time to pay the fine.

DOWNHAM (NORFOLK) PUBLIC LIGHTING.—At a meeting of the Improvement Commissioners on the 8th inst., convened for the purpose of arranging for the public lighting during the current year, Mr. G. F. Wood, the secretary of the gas company, explained that they were not prepared to make any alteration in the contract price for the lighting of the public lamps of the town till they had ascertained at the end of their financial year the pecuniary position of the company. Mr. Bennett, senr., proposed that the contract for the year be continued at last year's price and terms, leaving it to the gas company to make such reduction at the end of the year as they may be able to afford. Mr. Vince proposed as an amendment that, as the gas company were not prepared to give an assurance of reduction of price, the contract be held in abeyance till the commissioners receive such assurance from the gas company, and that the matter be referred to the Street Committee, to make arrangements for lighting the public lamps for the year. After a long discussion, the chairman put the amendment and motion to the meeting, when there were equal votes for each, and the chairman gave his casting vote in favor of the motion, which was therefore carried.

PRESTON GAS COMPANY.—The half-yearly meeting was held on the 11th inst.—Mr. J. Billington Booth in the chair. The report submitted stated that the directors had the pleasure of recommending the payment of the usual dividends at the rate of 10 and 7 per cent. per annum respectively. The proprietors would be glad to learn that the district of Higher Walton had this season been supplied with gas from the Preston works, and the extensive cotton mills and several houses were already lighted from the company's mains. The building of new offices in Fishergate had made some progress, and if the promises of the contractor were realized, they would be ready for occupation in the month of September next. Owing to the continual indisposition of Mr. E. R Harris, for many years a valuable member of the board, that gentleman, to the great regret of his brother directors, had tendered his resignation, and the vacancy had been filled up by the appointment of Mr. Wm. Dobson. The accounts showed that there had been expended on cannel and coal for the year ended the 30th of November the sum of £19,534; manufacturing expenses, £6608; and general expenditure, £7006. A balance of £15,220 had been carried to the dividend account. There had been received for gas and meter rents, £43,741; and for coke, £6682. The chairman moved the adoption of the report. Mr. R. Newsham seconded the motion, which was passed; and, on the motion of the chairman, a dividend at the rate of 10 per cent. on A stock, and 7 per cent. on B stock, was passed, being made payable on the 18th inst. Mr. H. C. Walton moved the re-election of Mr. Summersgill as auditor, which was seconded, and carried unanimously. On the motion of Mr. Allen, seconded by Mr. Parkinson, the retiring directors, Colonel Birchall, Major Mounsey, Mr. J. B. Booth, and Mr. Robinson, were re-elected; and in the place of Mr. E. R. Harris, who through continued ill-health, retired permanently, Mr. W. Dobson was elected. A vote of thanks to the directors for the management of the concern, and to the chairman for presiding, terminated the proceedings.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.—At the Meeting of the Board on Friday last, the Parliamentary Committee presented a report, in which they stated that their attention had been directed to the necessity of their having power from the board to confer from time to time with the committee appointed by the corporation, on the subject of the provisions of the three bills which the two bodies jointly were introducing into Parliament on the supply of gas to the metropolis. Under a former resolution of the board this power was given to the Works and General Purposes Committee. That committee had now fully reported on the references made to them on the proposed legislation, and the bills being now before the Parliamentary Committee with a view to their promotion in Parliament, it would be necessary for them to have a similar power to that given to the Works and General Purposes Committee. Many questions incidental to the bills would from time to time arise, upon which it would be necessary for the committees of the corporation and the board to confer, with a view to a joint course of action—they therefore recommended—"That the committee be authorized to confer from time to time with the committee of the City Corporation, with reference to the provisions of the three bills relative to the gas supply of the metropolis, which are to be submitted to Parliament by the corporation and the board, and to take all necessary measures for the promotion of the bills in Parliament." On the motion of Mr. Newton, the recommendation was adopted. The committee further reported that The Gaslight and Coke Company and the Phœnix Gas Company had deposited bills for the next session of Parliament, the Standing Orders in respect of which had not been complied with. The committee thought it desirable that a memorial should be presented from the board, complaining of such non-compliance, and they recommended—"That memorials be presented by the board, complaining of non-compliance with the Standing Orders in the bills deposited by The Gaslight and Coke Company and the Phœnix Gas Company, and that the seal of the board be affixed to the said memorials." The recommendation was adopted.

Dr. Letheby, the chief gas examiner appointed by the Board of Trade, has recently reported to the Corporation of the City of London, and to the Metropolitan Board of Works, the results of the daily testings of the gas supplied by the Chartered, the Imperial, and the South Metropolitan Gas Companies during the quarter which ended on the 31st of December last. He states that the maximum, minimum, and average illuminating power of the gas at each of the testing-places were as follows:—

Illuminating Power in Standard Sperm Candles.

	Testing-Places and kind of Gas.	Max.	Min.	Aver.
Imperl. Chartered Com. Company.	Common gas, Beckton	19·1	16·4	17·46
	" Cannon Street	17·6	16·0	16·68
	" Friendly Place	17·8	16·0	17·02
	" Ladbroke Grove	18·2	15·5	16·63
	Cannel gas, Millbank	22·4	20·0	20·80
Imperl. Chartered Com. Company.	Common gas, Carlyle Square	17·4	15·8	16·68
	" Camden Street	16·9	14·3	15·63
	" Graham Road	18·5	14·6	16·58
	" Bruce Terrace	19·4	15·0	17·36
	South Metropolitan Company, Hill Street	17·4	15·3	16·42

From which it appears that the illuminating power of the gas at each of the testing-places has been constantly above the requirements of the Acts of Parliament—namely, 16 standard candles for the Chartered gas, and 14 for the gas of the other companies.

As regards impurity, Dr. Letheby reports that on six occasions the gas of the Chartered Company at Ladbroke Grove was charged with sulphuretted hydrogen, and the same was the case with gas of the Imperial Company on five occasions at Bruce Terrace, Bow. The proportions of sulphur in other forms than this were as follows:—

Grains of Sulphur per 100 Cubic Feet of Gas.

	Testing-Places and kind of Gas.	Max.	Min.	Aver.
Imperl. Chartered Com. Company.	Common gas, Beckton	16·1	8·4	12·27
	" Cannon Street	11·6	9·3	10·37
	" Friendly Place	15·3	5·5	9·83
	" Ladbroke Grove	22·4	14·4	17·49
	Cannel gas, Millbank	23·6	12·7	17·63
Imperl. Chartered Com. Company.	Common gas, Carlyle Square	17·6	13·1	14·99
	" Camden Street	25·1	10·4	17·34
	" Graham Road	17·9	11·6	15·59
	" Bruce Terrace	22·5	4·1	10·83
	South Metropolitan Company, Hill Street	23·5	9·8	19·86

This impurity was in excess of the prescribed quantity on one occasion at Camden Street, on three occasions at Bruce Terrace, and on four occasions at Hill Street. All these, as well as the occasions when sulphuretted hydrogen was present in the gas, have been the subjects of investigation, and Dr. Letheby reports that the impurities in the Chartered and Imperial gas were due to accidental circumstances—namely, the derangement of valves—but he is unable to find a satisfactory reason for the excess of sulphur in the gas of the South Metropolitan Company. The proportions of ammonia in the gas ranged from 0·0 to 2·4 grains per 100 cubic feet, the average being 0·0 to 1·19 grain; and therefore the quantity of this impurity was below the prescribed amount of 2·5 grains per 100 feet. Dr. Letheby directs the attention of the Metropolitan Board of Works to the fact that testings of the gas were not made by their officers on 39 occasions, for the reasons specified in the tables which accompany the report.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in Marylebone during December last:—

DECEMBER, 1874.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 23 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Comp.'s gas	16·08	16·90	15·30	23·86	8·42	24·32	0·56	No trace
CharteredCompany's common gas	16·29	16·94	15·71	24·25	10·27	20·31	0·50	No trace
CharteredCompany's cannel gas	20·43	21·31	19·60	19·40	10·51	20·92	0·60	No trace

Mean of daily readings of barometer . . . 29·60
" " " thermometer . . . 47·62

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the Imperial Company's gas during December was equal to rather more than 16 candles; it ranged between 15·30 and 16·90 candles. The mean quantity of sulphur found was 24·32 grains, and of ammonia about half a grain. The mean light of the Chartered common gas was equal to about 16½ candles; it ranged between 15·71 and 16·94 candles; on five occasions it was a very little below the legal standard (16 candles). The mean amount of sulphur found in this gas was rather more than 20 grains, and of ammonia just half a grain. The cannel gas gave a mean light equal to nearly 20½ candles; it ranged between 19·60 and 21·31 candles; on five occasions this gas was also a little below the standard (20 candles). The mean amount of sulphur found in it was about 21 grains, and of ammonia rather more than half a grain. During the last 10 days of the month the day pressure of all the three gases was unusually low, sometimes not exceeding 6 or 7 tenths of an inch; this is generally supposed to be sufficient for day pressure, but my experience is opposed to this, and I am of opinion that in the dark foggy days of winter, when a great deal of gas is necessarily consumed, less than an inch of pressure is insufficient. The usual tests detected no trace of sulphuretted hydrogen in either of the gases. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Beckton and Bow.

CHELSEA VESTRY.—At the meeting on the 12th inst., Dr. Barclay reported that during the past quarter 29 examinations of the gas were made. Its illuminating power was found on an average to be equal to 18½ candles. The maximum on the 9th of November reached 14·7 candles, while the minimum on the 4th of December was only 11·8 candles. In these observations he had continued to use the old burners in order that a fair comparison might be made with previous reports; consequently, although on one occasion the gas fell below the old standard, it exceeded the minimum fixed by Parliament when tested by the new "London" burner, which had been accepted by the gas referees. On the whole, the light was considerably below that usually supplied by the London Gas Company.

ST. GEORGE'S EAST VESTRY.—At the meeting on Thursday last, a letter was read from the Limehouse District Board, suggesting that three members of the vestry should be appointed to attend a conference for the purpose of considering the bill proposing amalgamation of the Commercial and Ratcliff Gas Companies. Mr. Herbert said the parish had been well supplied by the Ratcliff Company, and he should like to know from Mr. Fairclough whether there was any likelihood of the interests of the parish suffering by the carrying out of the scheme. Mr. Fairclough said the Commercial Company were applying to Parliament to raise additional capital, as their present capital and works were insufficient for the demands of their district. In order to strengthen their case they had determined upon amalgamating with the Ratcliff Company, the directors of which had considered the matter, and were of opinion that their shareholders and the public would be benefited by the change. One thing in the new bill was worthy of notice, and that was they agreed to supply 16-candle gas at a maximum price of 3s. 9d. per 1000 feet. He personally considered that the parish would be better served by the amalgamated company, and it might be very desirable for the vestry to express some opinion upon the matter. After some further remarks, the matter was referred to the committee.

WHITECHAPEL.—At the meeting of the District Board on the 11th inst.—Mr. Brushfield in the chair—the Works Committee brought up a report recommending that petitions be presented to Parliament against the Metropolis Gas (Purchase) and the Metropolis Gas (New Works) Bills promoted by the Metropolitan Board of Works. The committee also expressed an opinion, "That it is desirable that some control as to uniformity of price and manufacture of gas in the metropolis should be exercised, but that such measures should be provided for by a bill to be prepared by the Secretary of State, or some other public officer, and carried into effect by some authority specially appointed by Parliament, instead of in the manner suggested by the Metropolis Gas Companies Bill." Considerable discussion took place relative to these matters, but eventually the further consideration of the subject was deferred for a week, and the clerk was instructed in the meantime to obtain and forward to each member of the board a copy of the several bills in question. The committee also reported that they had had under consideration the bill to be brought in during the next session of Parliament, to effect an amalgamation of the Commercial with the Ratcliff Gas Company; and that the clerk had laid before them a letter from the Limehouse Board of Works, inviting Whitechapel to send three delegates to confer with the representatives of the parishes and districts interested in the matter, in order to decide as to what action should be taken. The committee recommended that the invitation of the Limehouse Board should be accepted. This portion of the report was adopted, and delegates were appointed accordingly.

METROPOLIS WATER SUPPLY.

Dr. Whitmore's report on the composition of the Thames companies and other waters supplied in Marylebone during December last:—

DECEMBER, 1874.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling in degrees.	Hardness after boiling in degrees.
	Dec., 1873. 0°	Dec., 1874. 0°	Dec., 1873. 0°	Dec., 1874. 0°	0°	0°
Distilled Water . . .						
West Middlesex water	19·52	20·96	0·96	1·00	14·24	3·14
Grand Junction water	19·32	21·16	0·90	1·04	14·42	3·18

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

The water supplied by the West Middlesex Company during the month was clear and well filtered, that supplied by the Grand Junction Company was occasionally slightly turbid. The flooded state of the Thames in the early part of the month and the turbid condition of its waters, must have severely tried the resources of both these companies in their efforts to supply their respective districts with wholesome potable water, and the results show—especially with regard to the West Middlesex Company—how complete and satisfactory are the arrangements they have made for accomplishing this important object.

Major Bolton's report on the supply of water to the metropolis, during the month of December last, states that the condition of the water in the river Thames at Hampton, Molesey, and Sunbury, where the intake of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was generally bad throughout the month. The highest flood state of the river at Hampton during the month was 2 feet 2 inches above the (6 feet) summer level, and the lowest 2 inches below. At Ditton the state of the water in the river was good on 3 days, indifferent on 8, and very bad on 20 days during the month. From the 1st to the 15th inst., the state of the river at the intake continued to be very muddy and turbid, consequent upon the rains and floods. On the 8th the river suddenly rose 2 feet 7 inches, and on the 16th stood at 2 feet above summer level, during which time it was very turbid. On the 17th the water slightly improved and began to fine down. From an examination of the river book at the intake, it appears that this is the worst flood that has occurred in the Thames for the past three years. While these floods prevailed during the above period, the Chelsea Company were compelled to take in dirty water and distribute such as they could get through their filter-beds, which was extremely turbid flood water, imperfectly filtered; there was a considerable amount of solid matter in the water, and it was too fine to settle, the discoloration being caused by the chalk and clay carried down by the floods. This is very difficult of removal by filtration, being only practically got rid of by subsidence previous to filtration. The highest state of the flood water at this place was 3 feet 3 inches, and the lowest 4 inches above summer level. The highest temperature of the water during the month was 42°, and the lowest 32°, while the highest temperature of the air at the same place was 48°, and the lowest 11°. These observations were made daily at 9 a.m. The rainfall during the month was 2·24 inches. The water at the intake of the New River Company, was generally affected by floods during the month, but the intake was

closed while the water was in its worst condition. The East London Company possess such ample impounding reservoirs that their supply is not affected by floods, during the prevalence of which their intake is closed. The construction of further subsiding reservoirs by the Southwark and Vauxhall Company is most desirable, to avoid taking in water when floods prevail. The West Middlesex Company having large reservoir capacity, avoid taking in water when floods prevail. The Grand Junction Company also need further impounding reservoirs so as to avoid the flood waters. Much difficulty has been experienced by the companies during the last month in their filtering operations. Early in the month there was an extraordinarily heavy flood, which tended to choke the filters, and in some cases, before the filter-beds could be properly cleaned by removing the deposit of chalk, mud, and clay from the surface of the sand, the severe frost, which prevailed after the flood, froze the beds up when the water was run off for cleansing purposes, thereby rendering the utmost vigilance and exertion on the part of the companies necessary to enable them to properly filter their supply.

CHELSEA WATER COMPANY.—At the meeting of the Chelsea Vestry on the 12th inst., Dr. Barclay reported that an analysis of the water supplied by the Chelsea Water Company, obtained from the main in his laboratory, proved that the water had returned to the same degree of purity which it was ascertained to possess in the month of September last; the total residue was 20 grains of solid matter per gallon, combined with 1·1 grain of chlorine. The free ammonia amounted to 0·02 parts per million, the combined or albuminoid ammonia amounted to 0·11 parts per million. The water was transparent and nearly free from suspended matter. The analysis by Dr. Frankland of the Chelsea water obtained on the 3rd of December, and published on the 26th ult., fully bore out the statement made in his last report of the impurity of the water supplied at that date.

BIRMINGHAM (CORPORATION) GAS BILL.

THE ATTITUDE OF THE OUT-DISTRICTS.

WEDNESBURY.

At the Meeting of the Local Board of this Town on the 11th inst.—Mr. R. WILLIAMS in the chair,

The CLERK stated that he had received from the Mayor of Birmingham a memorandum of the proceedings at and results of the interview which took place on the 19th ult. between his worship and the deputation from this board in reference to the gas-works purchase scheme of the corporation. It was as follows:—

"The mayor expressed himself as desirous that the corporation should carry on the existing gas company's works in their entirety, but rather than have unwilling customers in the several sanitary authorities surrounding Birmingham, he would recommend the corporation to sell to such sanitary authorities, and for that purpose power had been inserted in the notice of the bill of the corporation. He thought there would be no objection for power to purchase by the sanitary authorities being inserted by consent in the bill. The purchase to be on terms to be agreed on before the bill passed, or provision to be made for arranging terms of purchase between the parties.

"2. The existing maximum charge by the Birmingham and Staffordshire Gas Company of 4s. per 1000 feet of gas to be maintained, and a provision to be inserted in the bill to that effect. The customers residing outside the borough to be on at least as good terms as to supply and price of gas as the consumers within the borough.

"3. The mayor stated that provision was made in the bill for a reserve-fund intended to equalize the price of gas and to prevent sudden fluctuations. The profits, if any, after such provision, would belong to the Corporation of Birmingham, who undertook all the risks of the transaction; but the mayor was of opinion that such profits would in all probability be applied in part to secure a reduction in the price of gas to all customers of the corporation, whether within or outside the borough. The mayor could not undertake to insert a provision to this effect, but considered that the best security for the fulfilment of the anticipation would be found in the desire of the corporation to satisfy its own consumers, and in the assurance that all outside districts should be on at least as favourable terms as the borough itself.

"4. The mayor suggested that representatives might be sent from the sanitary district to act on the Gas Committee of the Corporation of Birmingham, so that the interests of the several sanitary authorities might be watched."

The CHAIRMAN said he considered it a very fair statement of what took place; and there was this advantage about it, that it came from the mayor himself.

Mr. MARCH thought it was hardly as clear as to the point of the division of profits between the corporation and their customers as he should have liked.

The CHAIRMAN said that in the discussions which were going on on this subject all over the district there was a good deal of misconception, and two things were being mixed up together which were separate, and should be considered separately. The first had reference to the purchase of the present gas-works and the transferring of them to the corporation; and the second was the contemplated schemes of different outside parties making their own gas, which had nothing to do with the other. At present they in Wednesbury dealt with the gas company upon certain terms, one of which was that the maximum price should be 4s. per thousand; but certain authorities doubted whether, if the transfer to the corporation took place, the price would not go up to 6s. or 7s., and were for going into opposition. He would go into opposition too, if he thought the price would go up in this manner; but here they had the mayor's writing to say that the maximum should remain the same as at present; and if so, they in Wednesbury would have nothing to complain of. As to the question of the division of profits, he believed they would participate in that, under the corporation, to just the same extent as they had hitherto done under the company, because the corporation would wish to keep them as customers. The mayor had already pointed out that they would be placed on precisely the same scale as the people of Birmingham, and seeing that the people of Birmingham would be certain to resist any attempt to raise the price, they had one guarantee that their interests would be protected. But there would be another guarantee in the fact that it was proposed to form a reserve-fund out of all profits above 1s. per 1000 feet, which would be used in times of adversity to keep the price at one equal figure. Even if they were to oppose, he did not see how they were to get clauses inserted compelling the company to divide the profits; but seeing that the surplus profits were to be carried to a reserve-fund, they would be as well dealt with under the corporation as under the company. The second point was as to the making of their own gas. Before they could do that they would have to agree upon terms for the purchase of certain plant, and it would be very unwise to agree upon a price now, because they would have to buy under compulsion, and at very outside terms. They would have no further difficulty in getting a bill six or seven years hence, if they desired it; but, on the other hand, they would have a very strong case if it turned out that they were being unfairly dealt with. Further, the purchase would be a much more serious and complicated affair than might at first sight appear; and looking at the matter how they would, he for one was not prepared to go in for the town making its own gas.

Mr. LLOYD did not think his views and the chairman's differed very much; but it was very desirable that for their own protection they should take power to manufacture their own gas, without positively committing themselves to the exercise of those powers. As to the profits, the chairman overlooked the fact that the transfer of the works to the Corporation would remove that competition between the two existing companies which tended to keep down prices; and there was the additional fact that the companies were not allowed to make more than 10 per cent., but there would be no such restriction upon the corporation.

Mr. JAMES TAYLOR considered that the mayor's memorandum contained guarantees that their interests would be protected.

Mr. MARCH considered they had every guarantee as to the maximum, but they wanted a guarantee as to the minimum; they wanted some guarantee that they would be dealt with by the corporation in the same way as they had been by the companies, and that the price of gas should be at as low a minimum in Wednesbury as if the two companies had continued in existence.

The CHAIRMAN, in reply, said he thought they should have faith in the promises of the Mayor of Birmingham, and abstain from taking steps to obtain a *locus standi* in opposition. As men of business he believed they could settle the matter without that, and save expense. He suggested, however, that the clerk should see the town-clerk of Birmingham, inspect the draft of the bill to see that the points desired were in it, and obtain the signature of the mayor to the memorandum which had been presented. The suggestion was agreed to.

WALSALL.

A Special Meeting of the Walsall Town Commissioners was held on Wednesday last—Mr. BEDDOE presiding—to consider the three bills in Parliament relating to the proposed transfer of the undertakings of the Birmingham Gaslight and Coke Company and the Birmingham and Staffordshire Gaslight Company to the Corporation of Birmingham.

Mr. EVANS said there was a feeling outside that the price of gas in Walsall would be increased if the commissioners acquired the plant of the Staffordshire Gas Company, and thus got the entire control of the gas supply of the town.

The CHAIRMAN said he hoped there would be a still further reduction of price.

The TOWN-CLERK added that Mr. Brownhill, who, without doubt, was the best authority in the Midland Counties on gas-making, had stated that, after carefully considering the whole question, he was satisfied that after the commissioners had acquired the plant of the Staffordshire Gas Company, and had provided new works for the supply and distribution of gas to the whole borough, they would never have occasion to raise the price of gas.

After further discussion, it was unanimously resolved to oppose all the three bills in question, the town-clerk being empowered to prosecute such opposition in conference with the Gas Committee (which comprises all the commissioners), the expenses to be defrayed out of the gas funds.

After the meeting of the commissioners, a public meeting of ratepayers of the district was held in the Guildhall—Mr. Beddoe presiding—to authorize the necessary expenditure of the opposition out of the public rates. The Town-Clerk, in the absence of Mr. Brownhill (chairman of the Gas Committee), seconded the resolutions formally proposed for carrying out the object, and in a long speech gave a history of the gas undertaking of the commissioners. The facts stated by him, with an abstract of the last yearly accounts, we may give hereafter.

THE BIRMINGHAM CORPORATION AND THE GAS COMPANIES.

[From the *Birmingham Daily Post.*]

In another column we publish a document of interest in relation to the gas bill now being promoted by the Corporation of Birmingham. It is a report presented to the committee of gas consumers, who naturally desire that, in the transfer of the gas-works to the corporation, consumers shall not, at least, be worse off than they are under the Acts which regulate the existing gas companies. It is obvious that if the price of gas can be raised beyond the present limit, either by an actual advance, or by omitting to give consumers the benefit of a reduction after a fixed per centage of profit has been realized, then the consumers will be made to pay additional rates in the cost of gas, and of course the larger the consumption in individual cases, the heavier will be the differential rate imposed. An example is given in the report. On realizing a specified profit, and accumulating a specified reserve-fund, the companies are bound to share their profits with consumers by reducing the price of gas. By the proposed Corporation Act, however, this obligation is done away with, and all profits, after expenses, are to go to the general borough-fund. Large consumers, therefore, who might have benefited by reduced prices of gas, will lose this benefit, and will thus be made to contribute to the borough-fund a larger amount than they can gain by any reduction of rating arising from the profits of the gas-works. There are other matters in which the Corporation Bill affects consumers—for instance, the quality of gas, the examination of accounts, &c.; but the main question is that which we have indicated. A meeting of the consumers committee will be held shortly, when the objections to the bill will be discussed, with a view to taking action upon them.

"*Report to the Consumers Committee, on the Present Position of the Companies towards the Consumers, and the Change which will be occasioned by the Transfer of their Works to the Corporation, under the Provisions of the Town Council Bill.*

"Under the existing Acts of Parliament regulating the two Birmingham Companies, the consumers of gas are protected from excessive or unreasonable charges (1) by a limit being placed on the charge to be made by the companies for gas, (2) on the dividends payable to shareholders, and (3) by the application of the surplus profits to the reduction of the price charged for gas; and in order to give to the consumers a controlling power over the companies, so as to make these provisions efficient, the companies are required to deliver an annual account to the Town Council. And the consumers have a right to appeal to the petty or quarter sessions on certain questions.

"Under the Town Council Bill the consumers would be deprived of the most important of these protections (2 and 3) as will be seen by the following particulars. Whereas if any alteration be made in the regulations of the monopoly, they should be made more stringent when the monopoly is to be transferred from a trading company to a Municipal Corporation.

"AS TO PRICE.

"*Existing Provision.*

"The maximum price of the Birmingham Company is 4s. 6d. (1855 Act, sec. 57).

"The maximum price of the Staffordshire Company is 4s. (1858 Act, sec. 12), except in Northfield, Yardley, and Solihull, where it is 5s. (1864 Act, sec. 12).

"*Town Council Bill.*

"These prices are not altered. But the limit of price is not a sufficient check. Moreover, the limit is too high. It has never been reached since it was prescribed.

"AS TO DIVIDEND LIMIT AND THE APPLICATION OF SURPLUS.

"*Existing Provision.*

"In the Birmingham Company the maximum dividend is 9 per cent. on shares A and B, 7½ per cent. on ordinary new shares, and 5½ per cent. on preference shares (1855 Act, sec. 2).

"In the Staffordshire Company 10 per cent. on original shares (1845 Act, sec. 120) and 7½ per cent. on new shares (1858 Act, sec. 10).

"The Gas-Works Clauses Act, 1847, sec. 31 (which is applicable to each company as to profits) provides that if the clear profits in any year exceed the limited amount of the dividends, the excess (after making good any deficiency in any previous year below the prescribed limit) is to be invested in Government securities, and the dividends accumulated until the fund so made amounts to one-tenth of the paid-up capital; which fund is applicable to the equalization of dividends and payment of extraordinary demands, if these demands are sanctioned by two justices (sec. 32).

"The Court of Quarter Sessions, on the petition of two gas consumers, may appoint an accountant to ascertain condition of gas company's concerns; and if it

appears that the profits of the preceding year have exceeded the prescribed rate, and the whole of the reserved fund has been invested, and maximum dividends have been paid, the court may order a reduction in the charge for gas (sec. 35).

"*Town Council Bill.*

"These restrictions will cease by the operation of clause 20, stated more fully hereafter.

"These enactments, it is declared by clause 19, shall not apply to the Birmingham Corporation; and clause 20 authorizes and requires the corporation to apply all money received for gas as follows—namely, in payment of the costs of the Act, and of granting annuities and mortgages, of the working and establishment expenses, of annuities and interest, of instalments to sinking-fund, of the other expenses of executing the Act, in raising a reserve-fund, until it amounts with its accumulated dividends to £100,000, which is to be applied in answering any deficiency in the income of the corporation from their gas undertaking; and the surplus, together with the interest from the reserve-fund after it amounts to £100,000, is to be paid to the borough-fund.

"ACCOUNTS.

"*Existing Provision.*

"By the Gas-Works Clauses Act, 1871, sec. 35, each company is required (under a penalty of 40s. for every day) to send to the Town Council, on or before the 25th of March in every year, a statement of the annual account up to the previous 31st of December, in the form prescribed by the Act; also to sell a copy of such statement to every applicant, for a shilling. The Board of Trade may alter the prescribed form of account with consent of the company.

"*Town Council Bill.*

"This provision is left untouched, but some other mode than sending it to their own town-clerk must be provided for the publication of the Town Council's annual accounts. Moreover, the prescribed form of accounts was designed for companies, and is not suitable for an account between a Town Council and the consumers.

"THE QUALITY OF GAS.

"Fourteen candles is the prescribed test of illuminating power in each of the company's Acts.

"In practice it has been more than 15 candles.

"RYLAND, MARTINEAU, AND CARSLAKE.

"7, *Cannon Street, Birmingham, Jan.*, 1875."

THE DUBLIN CORPORATION AND THE GAS COMPANY.

ACTIONS FOR PROFESSIONAL SERVICES IN PARLIAMENT.

At a Special Meeting of the Dublin Corporation, on the 11th inst.—the Right Hon. the LORD MAYOR presiding,

A letter was read from Mr. M'Sheehy, asking for instructions respecting the actions pending by four gas engineers—Messrs. Clemenshaw, Pritchard, Stevenson, and Church—against the corporation, for a sum of £1376, for services, &c., in connexion with the gas bill. Mr. M'Sheehy stated that unless defences were filed on Friday, the plaintiffs would be entitled to mark judgment.

Mr. FRENCH observed that the letter only referred to part of a large sum of £3700, and he proposed that the law agent be instructed to make the necessary defences.

Sir JOHN BARRINGTON suggested that the matter be referred to a committee of the whole house.

Mr. FRENCH observed that that course would merely have the effect of cushioning the subject. The whole proceeding was illegal.

The Hon. Mr. VEREKER said the matter had already been referred to No. 1 Committee, with full power to act.

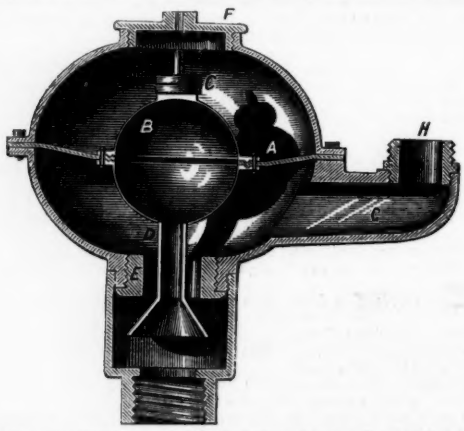
Mr. BURY said the matter had been before the committee on the previous Saturday, and on a division there were 5 in favour of filing defences, and 7 against. It was incumbent on the corporation to deal with the question at once.

Mr. FRENCH said the law agent had taken the opinion of an eminent counsel, and that gentleman gave it as his opinion that the corporation were not liable. That opinion could not be read.

The matter was referred to a committee of the whole house, to sit on the following day.

ADAMS' GAS-REGULATOR.

The annexed engraving is a sectional view of a new gas-regulator, patented in America last year by Mr. Joseph Adams, of Philadelphia. It is based on the principle of allowing the pressure of the gas to act on a flexible diaphragm which is connected with a valve, arranged to open and close as the gas is turned on or off from the burner, or as the pressure varies in the street-mains. The circular casing of the regulator is of metal, and the parts are joined together through the flanges shown. The latter also fasten, with a gas-tight joint, the outer edge of a flexible annular diaphragm, A, the inner edge of which is riveted between the flanges of the thin metallic hemispheres which form the balloon, B. Upon the top of the latter is a rod, upon which are placed weights, C, to adapt the governor to the variation of pressure for different elevations. The lower hemisphere opens through a pipe, D, to the supply of gas from the meter below; this pipe terminating in a funnel-shaped valve which plays in the valve-seat, E. The latter is attached to the bottom of the case, and is adjustable, so as to be lowered to reduce the orifice around the valve, and by this



means adapt the apparatus to a low pressure of gas. A movable plate, F, is screwed into the upper portion of the outer casing, and has in its centre a small hole for the admission of air to counteract the pressure of gas upon the diaphragm. G is a conduit for the gas, and H the connexion for the service-pipe. In operation, the valve is adjusted to the particular elevation or pressure of the locality by means of the weights. As the valve, pipe, and diaphragm are in a state of suspension by reason of the buoyancy of the balloon, the pressure on the gas being neutralized by the atmospheric air on one side and by the weight on the other, the diaphragm becomes particularly sensitive to an increased or diminished flow. If the pressure be increased, the diaphragm, balloon, and valve are raised, and the valve orifices proportionally closed; if diminished, the same portions are depressed by the air pressure and weight, the orifice opened, and the flow augmented. For very low pressures the weights may be entirely removed and the valve-seat lowered, or both, as required. By this delicate arrangement, it is claimed that the flow of gas through the burners is made uniform and independent of the pressure from the main, and also of the number of burners employed at a time.

GAS-EXHAUSTERS AT THE BECKTON WORKS.

By the courtesy of our contemporary—*Engineering*—we are enabled to present to our readers, on the opposite page, some admirable drawings of the gas-exhausters recently erected by Messrs. Gwynne and Co., of Essex Street, Strand, at the Beckton works of the Chartered Gas Company.

As we have frequently had occasion to refer to the buildings and apparatus at Beckton, it is hardly necessary we should say that, we perfectly agree with our contemporary in the remark that these works include all the most modern appliances and machinery for carrying on as perfectly and economically as possible the manufacture of gas on an extensive scale. The description of the apparatus, now illustrated, is thus given by *Engineering*:—"Amongst other machines are *five sets* of Messrs. Gwynne and Beale's patent gas-exhausters, one of which is illustrated in the accompanying engravings. Fig. 1 shows a side elevation, fig. 2 a plan, and fig. 3 an end elevation of the exhauster and its driving-engine. These exhausters—which are manufactured by Messrs. Gwynne and Co., Essex Street Works, Strand—are of a new design, and are a marked improvement upon Beale's old plan, in which the slides were drawn out by means of a piece cast on the end. The new exhauster has a steel pin running the entire length of the slide, which passes through a hole carefully bored out, and which greatly increases the wearing surface. Another improvement consists in the use of outside bearings in place of the roller-boxes used in the old plan. As a rule, it is found that the temperature of the gas is considerably raised in passing through the ordinary exhauster. In the machine under notice the increase in temperature is hardly perceptible, owing to the reduced friction, a fact established by several years working, and which can at any time be ascertained at the Beckton station, where machines of both kinds are working side by side. The cylinder of the exhauster we illustrate is 48 inches in diameter and of the same length, and exhausts 157,500 feet per hour. These are not the largest exhausters of this pattern made by Messrs. Gwynne, there being two at the works of the Imperial Company at Bromley, and two at the Commercial Gas-Works, each of which exhausts 200,000 cubic feet per hour. The arrangement of the inlet and outlet valves is neat and compact, as will be seen by the engraving. The engine, which is also shown in our engravings, has a cylinder 18 inches in diameter with a 24-inch stroke, and is fitted with variable expansion gear and condenser. It is worked with 40 lbs. of steam, cut off at one-eighth of the stroke. The expansion gear is of the ordinary type on Meyer's principle, with two plates on the back of the main valve. The bed-plate is cast in one, and carries a bracket, to the end of which the cylinder, which is steam-jacketed, is bolted, and overhangs without any supporting feet. The whole design of the engine is very simple, and well worked out, the proportions being good.

"The index at the end is a neat and simple arrangement, as is also the hydraulic regulator, which is an improvement upon the old plan, and requires very little alteration by the attendant. The old form of regulator requires constant attendance, whilst the new one only needs altering once or twice a day in the course of ordinary working.

"An inspection of some of these engines and exhausters enables us to add that their workmanship and finish are all that could be desired."

To the above description we add a few further particulars. The segments of these exhausters are made of hammered wrought iron, most carefully fitted to the grooves in which they work, and as a certain amount of centrifugal force is generated by the rapid revolution of the segments, the body of metal is largely reduced by a series of holes to the minimum. A cast-steel spindle, the entire length of the slides, is secured at each end on the segments, and the slide blades have holes carefully bored in them as accurately as a gun-barrel, and through these holes the cast-steel spindle passes, thus giving the entire length of the slide as a wearing surface, instead of a couple of inches, which was the old practice in making Beale's exhauster. Messrs. Gwynne and Co. invariably adopt double slides—that is, one sliding over the over—so that the weight of the moving slides is reduced, and the action is more perfectly balanced, and the thumping noise that used to be experienced is avoided. From very careful observation it has been discovered that these exhausters pass 10 per cent. and 15 per cent. more gas than the old form of Beale's exhauster.

The bearings have been largely increased in length and diameter, and instead of roller-boxes as before, a valuable composition of metal is applied, with very satisfactory results, as it resists the action of the tar and gas, and gives most excellent wearing surfaces.

In addition to making the exhausters work in the best manner, the greatest care is taken to reduce the consumption of fuel. The engines supplied to work these exhausters have given such superior results that the experience of Mr. Jones, engineer to the Commercial Gas Company, Stepney, a thoroughly practical gas engineer, is appended, to show that the absolute saving in the consumption of fuel is very great, and far exceeds anything that has been done before in the exhauster-house. Mr. Jones remarks: "The two engines and exhausters you have recently erected at these works, of 84,000 and 210,000 cubic feet per hour, have given me the utmost satisfaction as regards their effectiveness and economy. The saving in fuel I find to be somewhat over 33 per cent. in favour of your engines."

The whole of the exhausters of the Imperial Gas Company at Bromley are on this plan, and some of the largest gas companies in the country, as well as most of those in London and on the Continent, have adopted these valuable improvements. We are informed that exhausters of all sizes can be seen in the course of construction at Messrs. Gwynne's works, where engineers may procure any details they may require. Where room is important, vertical or trunk engines can be supplied instead of those on the horizontal plan, as at the Imperial Gas Company's works, Bromley.

THE THAMES CONSERVANCY AND RICHMOND VESTRY.—At a meeting of the Richmond Select Vestry last Tuesday, Admiral Stopford in the chair, a reply was read from the solicitors of the Thames Conservancy to a communication from the vestry, suggesting that the prosecution in the Court of Queen's Bench be suspended for six months. The letter concluded by stating: "Under these circumstances we are instructed by the conservators not to waive their claim for costs incurred by them in the performance of duties imposed on them by the Legislature. When the vestry have consented to pay the costs, we will obtain the instructions of the conservators as to the proposed suspension of the prosecution." A long discussion followed the reading of the letter, as to what course should be pursued. Some of the members expressed an opinion that the vestry ought to have paid the penalty on their case being decided by the magistrates, but the majority were for fighting the case. Ultimately, on a division, it was resolved, by eleven votes to five, that the appeal be proceeded with if the Thames Conservators would not waive their claim to costs, and that the vestry-clerk take the necessary steps to have the appeal heard.

GAS-EXHAUSTERS AT THE BECKTON WORKS.

FIG. 1.

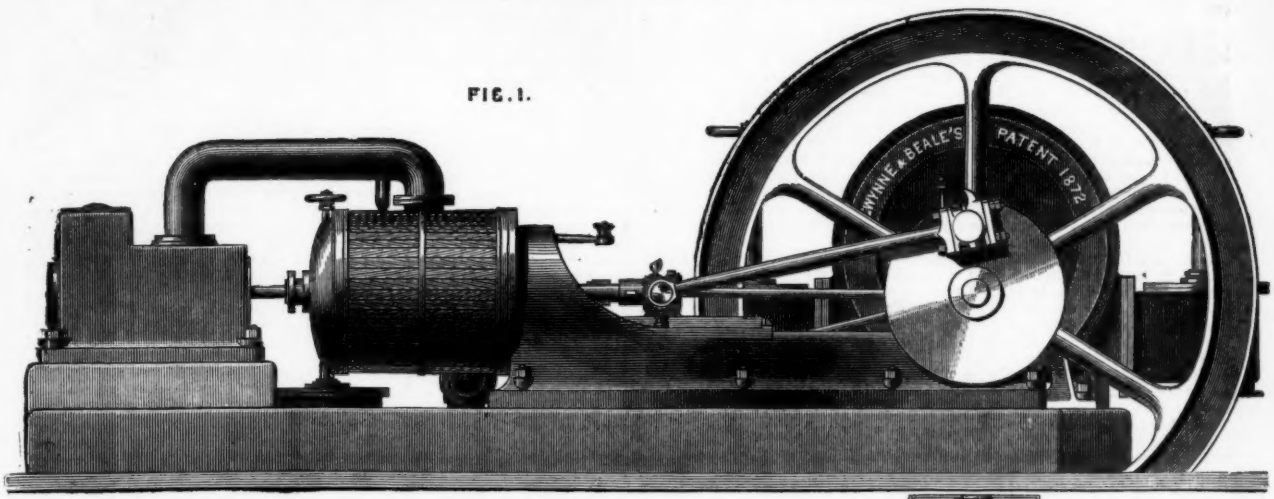


FIG. 2.

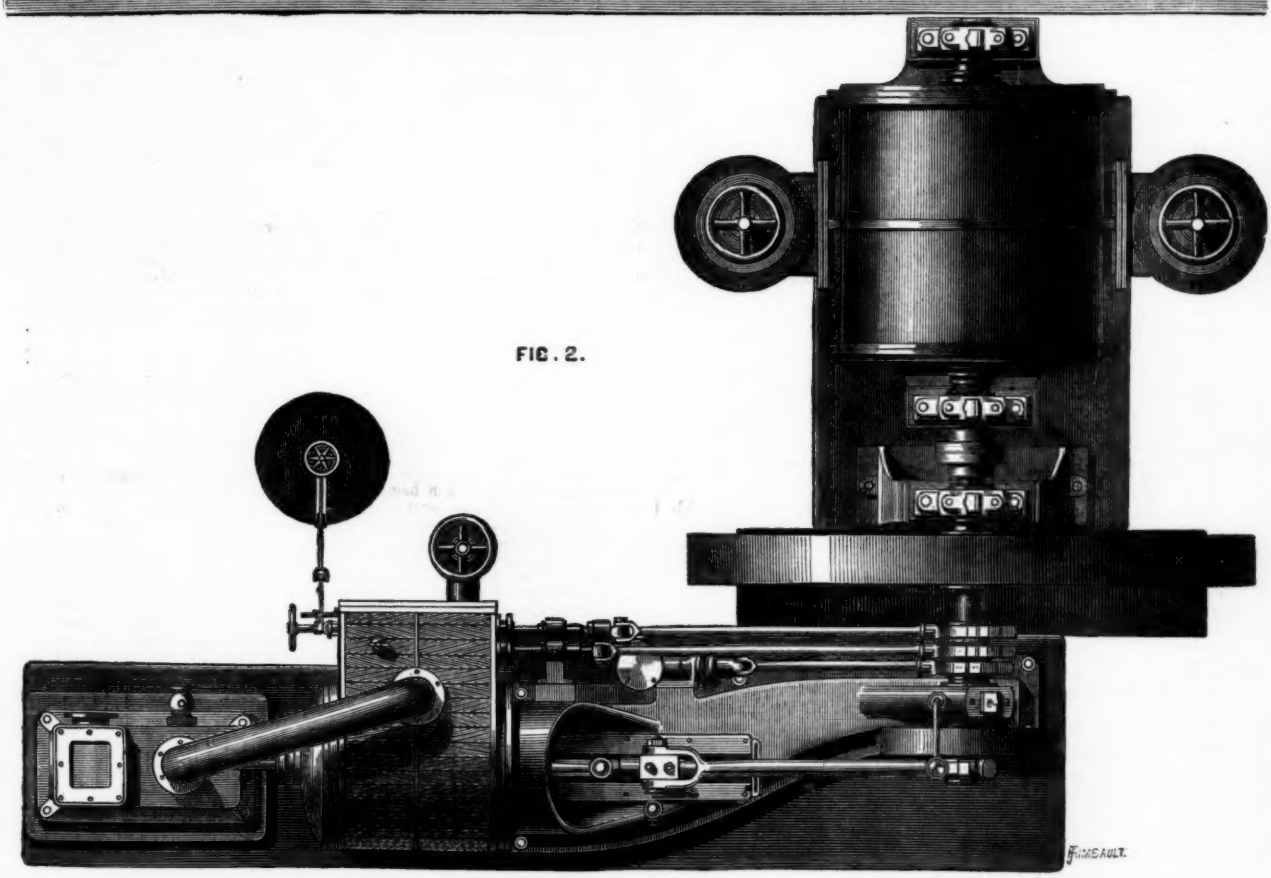
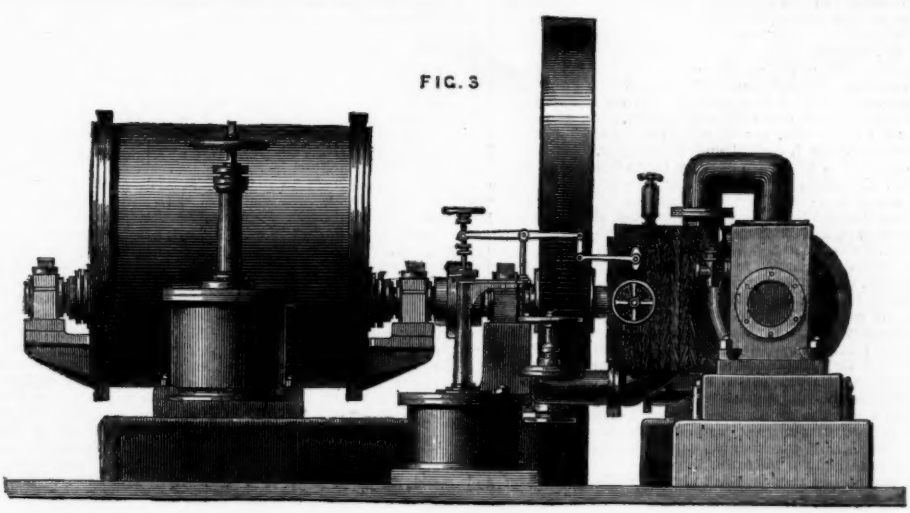


FIG. 3



NEWCASTLE-ON-TYNE WATER SUPPLY.

PROPOSED PURCHASE OF THE WATER-WORKS BY THE CORPORATION.

At a Meeting of the Newcastle Town Council, on Wednesday last—the MAYOR (Mr. A. Potter) in the chair,

A report was presented from the Sanitary Committee, in which they stated that they had had a meeting with the sub-committee of the Gateshead Corporation, for the purpose of discussing, under the authority given by the council, by their resolution of the 16th ult., the course expedient to be pursued with reference to the water supply of Newcastle and Gateshead. Having given to the subject the most careful consideration, the joint committee passed the following resolution:—"That the committee of each corporation report to their respective councils that, in the opinion of the joint committee, it is desirable that they should be authorized to open negotiations for the purchase of the works of the Newcastle and Gateshead Water Company, and report their proceedings, so that the councils for the two boroughs may decide on the course to be pursued." Your committee recommend the council to confirm this resolution, and to refer the same back to the committee to conduct the requisite negotiations with the water company, and report to the council.

Alderman HARLE, in moving the adoption of the report, and that the committee be authorized to conduct the negotiations, said he believed the two corporations united would obtain from the water company, he did not say a bargain, but, at all events, the works of the company, on reasonable terms, because all parties, he thought, after the recent controversy, were agreed that the works in question ought to be in the hands of the municipal body. A very great authority who had been mentioned—Mr. Rawlinson—was strongly of that opinion; in fact, most persons were of that opinion; and it was now for them, in a quiet, orderly, and business-like fashion, to carry out the views described in the report.

Mr. COOK seconded the motion.

Alderman GREGSON said he trusted the council would on this occasion come to a little common sense. When he found a proposition to buy up a company with between £500,000 and £600,000 capital—when he heard such a proposition coming from men who were talking about it as an entire failure, he thought they showed a degree of intrepid audacity that was rather surprising. He could not understand how, when the thing was a failure, they were to spend £600,000 or £700,000 in buying it, and perhaps another million in making what was called a complete water scheme. We had more rain and snow recently than we had had for many years, and there would probably be no difficulty as to water for some time to come. He did not know that we had been worse off than our neighbours. The whole attempt on the part of Gateshead had been to draw in Newcastle to pay the piper. That was a fact. Walker had repudiated any payment of the expenses, and other places said they might take it if the scheme was carried out. He was sure the ratepayers would protest against any such enormous scheme as that of buying up the water company, and spending another million. The water company had undertaken to supply water; it was their business to do so, and if they failed the corporation had a remedy. But they had not failed more than their neighbours. He indignantly protested against the corporation joining Gateshead or any other corporation.

Mr. HAMOND was rather astounded at such a proposition being made, at the present juncture of affairs, by Mr. Harle. Even the presentation of the report was not yet on the paper, much less the moving of its confirmation. He submitted, first, that it was out of order to move the confirmation of the report when it was not on the *agenda*, and he would take the sense of the council if it was ruled that a report not first printed was to be confirmed. It was a most unusual thing, certainly, in regard to involving the town in a million or a million and a half of money. It had never been his fortune to hear such a proposal. The second objection he had was that he was at a loss to know what power these gentlemen had. It was merely a side-wind to get Alderman Harle's proposal carried by the council. Mr. Harle gave notice of a motion to negotiate with the company for the purchase of their works. What was done instead? It was agreed that as a sanitary authority they should enter into an arrangement with the Gateshead Corporation, as a sanitary authority, to take what steps were thought expedient. For what purpose? To investigate the different schemes proposed, and to report upon the terms and conditions of these schemes. He held that the resolution of the last meeting of the council did not authorize the joint committee of Gateshead and Newcastle to enter into a question of negotiating with the Newcastle and Gateshead Water Company. The whole discussion went merely to one thing—to appoint a committee to act jointly with Gateshead in ascertaining from what sources they could in future get a full and adequate supply of water. The water company had by their own letters proved themselves unable to supply the two boroughs fully and adequately with water for domestic purposes. The council were now stultifying every action which they had committed themselves to for the last four or five months. He held that the mayor had no right to put such a motion as the confirmation of the report of the joint committee, inasmuch as it was beyond their scope. Supposing that they had power to treat with the present water company, if the company was in default their works were not worth above £100,000 or £200,000 upon what capital they had invested in it. It was an expenditure of several hundred thousand pounds whether the company was treated in default or as a current-going concern. If the committee had not done as they were requested to do, let them resign their places, and let the Newcastle Corporation, if they wished, take up the question as a municipal body. But they could only then treat with the company, not as a company in default, but as a current-going concern paying the dividend they at present pay; and this would involve the inhabitants in a quarter of a million or more of money. It seemed to him that this was a cool and deliberate proposition to pay a large sum of money, totally unnecessary and unjust, for the present works of the water company as a cutrent-going concern, to save them the expense of going to Parliament to do what they were bound to do. He said, and he said advisedly, that they could supply this town and Gateshead, from Ulleswater at far less money. He had gone most carefully into every estimate connected with Ulleswater. He held that everything connected with Ulleswater would not altogether cost one million of money. Mr. Bateman had repudiated Ulleswater for Newcastle, but what he condemned for Newcastle he recommended deliberately for Liverpool and Manchester. He defied Mr. Bateman, first-rate engineer as he was, to disprove that a full supply of water could be brought from Ulleswater to Newcastle at less than one million of money, including a reservoir to hold 5 million gallons of water, and the laying of pipes in Newcastle and Gateshead. He expressed his surprise at the facility with which gentlemen had swallowed their own words on this matter.

Alderman BELL said he was not going to offer an opinion as to whether there might not have been some irregularity in the way in which the proposition had been brought forward, but he thought they were quite competent to consider this proposal without stultifying themselves to the extent pretended by their friend, Mr. Hamond. It was admitted that the water company had failed to supply the town as it ought to have done, and it therefore seemed to him that the corporations, acting jointly, should lose no time in putting the matter on a proper footing, and that they should not interpose any mere act of formality in expediting that business. He was not aware that there was a word in the resolution from the Sanitary Committee involving the council, or any one else, in the purchase of the water company's works at any particular sum. This much, however, was certain, that a great portion of the works of the water company would be requisite, from whatever source they brought the water—for instance, the pipes for the supply of the town.

Alderman HARLE said he had no objection to let the matter stand over, and this course was accordingly adopted.

WILLIAM MURDOCH, THE INVENTOR OF GAS LIGHTING.

At a dinner, celebrating the James Watt Anniversary, which the foremen engineers of Glasgow held last Saturday evening in that great seat of engineering, as well as the scene of Watt's early triumphs, an exceedingly interesting address was delivered in proposing the toast of the evening, "The memory of James Watt," from the chair, which was worthily occupied by Mr. John Thomson, manager to Messrs. Laidlaw and Son, gas and water engineers. In the course of his address, Mr. Thomson briefly glanced at the character and achievements of one of the ablest of Watt's many able assistants. Foremost amongst these, he said, must certainly be placed the name of William Murdoch, the Ayrshire millwright, and the son of the inventor of bevel cast-iron gearing as applied to mills, and who was himself a mechanician of great abilities for his time. There is a good story told of Murdoch's first interview with Boulton, Watt's partner, at the Soho Works, Birmingham, when applying to that gentleman for a job. During the brief conversation that ensued, the blate (*Anglicè*, bashful) young Scotchman, like most country lads in the presence of strangers, had some difficulty in knowing what to do with his hands, and unconsciously kept twirling his hat with them. Boulton's attention was attracted to the twirling hat, which seemed to be of a peculiar make. It was not a felt hat, nor a cloth hat, nor a glazed hat, but seemed to be painted, and composed of some unusual material. "That seems to be a curious sort of hat of yours," said Boulton; "what is it made of?" "*Timmer*, sir," said Murdoch; "timmer." "Do you mean to say it is made of wood?" "Yes, sir." "Pray, *how* was it made?" "I turned it mysel', sir, in a bit lathey o' my own makin'." Boulton looked at the young man again, and observed that he was tall, good-looking, and of an open and ingenuous countenance; and, bearing in mind that he had been able to turn a wooden hat for himself on a lathe of his own making, Boulton considered that the fact was sufficient proof that he had before him a mechanic of no mean skill, and said, "You may call again, my man." "Thank you, sir," said Murdoch, giving a final twirl to his hat, and from that day Murdoch was placed on the permanent staff of the firm.

Beginning as a common mechanic, he speedily rose through the grades of foreman and manager, to be the trusted co-worker and adviser in all the important mechanical undertakings of the firm. After a brief sojourn at the works, he was sent to Cornwall, where matters of vital importance to the firm were taking place. His steady application, coupled with his love for his work, soon established him in Watt's regard, and it is told of him that so engrossed was he with his work, that he could not sleep at night. When one of the large engines was about ready to be started, the people of the house where he lived were alarmed one night by a loud knocking in his room, and when they rushed in, there was Murdoch in his shirt heaving away at the bed-post in his sleep, and shouting out, "Now she goes, boys, now she goes." He had literally to fight his way to the affections of the Cornishmen, and, being a tall, powerful fellow, soon impressed them with a due respect for his physical powers. It is even said that he fought a duel with the elder Trevithick on some point where he considered his master's honour impugned. But Murdoch, during his protracted stay in Cornwall, achieved other and nobler works, for to him are due many of the most important improvements in the pumping-engine. Loth were the Cornish mine-owners to part with him, and they even made him tempting offers to stay. But William was not to be seduced from his allegiance to the firm, and so he returned to take charge of the works at Soho, where he planned many of the most ingenious and important tools for executing various parts of the work. Murdoch was the first maker of a model locomotive in 1784, and one cannot help regretting that he did not follow up the invention which afterwards led to such great results. He was also the inventor of the "sun-and-planet" motion, which Watt much preferred to any of his own expedients for obviating the difficulty about the crank. In 1785 he invented the first oscillating engine, the working model of which is still in the possession of his family. The invention of the D slide-valve is also due to Murdoch, and which, although Watt was very much opposed to it, he ultimately adopted on account of its greater simplicity to his own arrangement of valves. He also invented a rotary engine, of ingenious construction, which worked for many years; and the principle of compressed air as a motive power was also employed by him to drive the pattern-shop engine, which it did for years.

But the invention of all others that ought to hand the name of William Murdoch down to posterity, and place it on one of the foremost pinnacles of fame, as that of a pioneer of civilization and a benefactor of his species, is his invention of lighting by gas; for to Murdoch is assuredly due the merit of this great discovery, and which, perhaps, next to the steam-engine, has done more to ameliorate the condition and advance the comfort of mankind than any other invention of modern times. Murdoch did for gas lighting what Watt did for the steam-engine. Watt's comprehensive mind saw all, or nearly all, that the condensing engine is capable of being made; and it is a striking fact that it is to this day very much the same in principle as when it left his hands. In like manner, Murdoch's apparatus for the production of gas was not materially different from what may be seen in many of the gas-works of the present day. Murdoch soon put his invention to practical test, by lighting up his own dwelling, and afterwards the offices of the works at Soho; and the first public exhibition of the new light took place on the celebration of the Peace of Amiens, in 1802, when the front of the manufactory at Soho was brilliantly illuminated by gas, to the astonishment and admiration of the public. Such, then, was William Murdoch, the friend and assistant of Watt, and long the Mentor of the firm. He was a man of eminent mechanical abilities and inventive genius, and but for being so closely allied with Watt, and overshadowed, as it were, by the greater lustre of his name, would have made a name for himself, as an inventor and a benefactor of his species, second only to that of his great master, to whom he was most sincerely attached.

GAS EXPLOSION AT RETFORD.—On Monday week a very serious explosion of gas took place at the music warehouse of Mr. Charles Hodson, East Retford. The inhabitants were made aware that something of a serious character had occurred by a loud report like the discharge of a cannon, which was heard for a considerable distance out of the town, and on going to the spot, it was found that Mr. Hodson's front window on the first floor had been blown across the street by the force of an explosion of gas. It appears that Mr. Hodson was going to his piano store-room with a light when the accident occurred. He was seriously injured. Some 14 pianos were much damaged, legs being blown off some of them; two of them were set on fire. The cornice of the room and the plaster were blown into the room above through the ceiling, and the laths set on fire. The front wall has sustained a severe fracture. The fire was extinguished before it spread to any extent, and the fire brigade, with the engine, were quickly on the spot.

ILLUMINATING GAS FROM EXCREMENTITIOUS MATTER.—Mr. Albert Sindermann has lately made known to the municipal authorities of Breslau the fact that he manufactures lighting gas from excrementitious matter and mud on one of his estates situated outside the town. According to the *Gazette* of Silesia, the process is as follows:—The apparatus, placed in a vault, consists of a reservoir, which collects the matters and distributes them by a sluice into a retort situated at a lower level. From this retort the gases escape into a tar-well, and then into the condenser. The purifying is accomplished by means of lime water, and lastly the gases are made to pass over pure water, when they are collected in the gasometer. The gas thus obtained burns with a purer and softer flame than coal gas; its odour is slightly acid, and is not disagreeable. The residuum, such as coke, tar, and grease, is inodorous, and readily turned to account. The necessary works are not more costly than ordinary gas-works; and, on the other hand, the gas obtained is cheaper than coal gas, while no disagreeable smell is noticed in the neighbourhood of the works.

CAOUTCHOUC AND ITS INDUSTRIAL USES.

[Extracts from a paper by EUGENE PAVOUX, Director of the General India-Rubber Manufactory at Brussels. Reprinted from the *Journal of the Society of Arts.*]

The applications of india-rubber to industrial purposes are exceedingly numerous, and are increasing daily. "Its elasticity, its tenacity, added to which, the property it possesses of being completely homogeneous and impermeable, recommend it for a vast number of uses in which it would be difficult to find a substitute."*

The various kinds of joints which are used for water-pipes, gas-pipes, and steam-pipes, may be classed in several categories, and india-rubber is used in all of them. The flat washers for flange joints are made in various qualities of material, but most frequently by means of one or several cloths dipped in the paste, and intended to prevent the lateral extension which would take place in pressing the surfaces together, as well as by the heat, in the case of joints with steam at high pressure; the number of cloths depends upon the thickness of the washer. Instead of being parallel at the surface, the cloths are frequently disposed concentrically, and are placed at a distance from each other of from 2 to 3 millimètres. The same result may be obtained with felted india-rubber—that is to say, mixed with fibrous matter, such as woollen or cotton waste, &c., which by their resistance admit of greater tenacity, and cause the lateral extension to be less felt.

In laying the flange-pipes, it often happen that, through the negligence of the workman, the centre of the washer does not coincide with the axis of the pipe, and causes a projection in the inside. When this defect presents itself at the lower part of a steam-pipe, it prevents the waste water from running off; it is better, therefore, to adopt the system in which the washer is kept in its place by a flange at one of the ends of the pipe; the play left between the two pipes admits of expansion, without causing any danger.

The washers with circular section, which are used for joining the pipes, are especially employed in the ingenious system of which M. Léon Somzé is the inventor. The washer is introduced by being rolled into the annular space between the two ends, called male and female, of the jointing pipes, and is kept by the conical form of the male end in a perfect state of compression.

In making Delperdanges joints it is necessary to use a ring forming a band, which, placed on the flanges, which are close to each other, of two pipes, is compressed and kept in its place by an iron bridle, terminated with two claws, which are pressed and brought together by a bolt. A copper sheet keeps the rubber against the pipe where the claws are. This system has been at work in the water distribution of Lille and Valenciennes. Lastly, certain joints are made by means of a cord, either round or square, made of india-rubber alone or of felted rubber, which is placed in a groove in the two surfaces which have to be joined. The compression of this cord hermetically closes the two ends of the pipes.

India-rubber enters largely into the construction of machines, and especially of pumps. The valves vary in form as well as in thickness; some are round, others are square or rectangular. The seat on which they rest has several apertures; they are thus supported otherwise than on their edges, which preserves them against the pressure. The metallic breastwork which forms the seat ought to present no projecting edge, which would enter into the material, and cause speedy deterioration. These valves are, for the most part, made of simple india-rubber, but sometimes cloth is put between to give them greater tenacity. The special circumstances under which they have to be employed will guide the maker in the selection.

Certain valves are composed of a simple metallic sphere, covered with india-rubber, which, being raised by the liquid, falls down again as the piston descends on the orifice it is intended to close. In order that these valves may retain sufficient suppleness to admit of their hermetically closing the orifice, it is better that they should consist of a hollow india-rubber sphere filled almost entirely with small shot.

An ingenious application of india-rubber is that which has been made by M. Field, in respect to a valve composed of two india-rubber discs, slightly conical, and placed face to face. These discs are flat, and pierced with a hole in the centre; but they are compressed, and made to assume a conical shape by metallic pieces in the interior. Their external edges are in contact with each other, and maintained thus by the pressure which is exercised on their outer faces. The principal merit of these valves is their perfect resistance to the strongest pressure; in fact, their action being exerted in every part at the same time, the lips of the valve are forced against each other with an energy which is greatest when the pressure is strongest. Messrs. Whitley, of Leeds, have applied this valve to all kinds of pumps for pumping either cold or warm water or other liquids, at pressures rising as high as 10 and even 13 atmospheres.

The Perreaux valve is exclusively composed of india-rubber. The side gets gradually thinner until it comes to the sharp edge, which is split, and opens out a little under the pressure of the liquid; it closes again as soon as the piston begins to descend.

As regards pumps which are intended to pump acids, an india-rubber bucket is used, in which the rod of the piston is placed. These pieces are moulded.

Hydraulic press-rings made of india-rubber replace advantageously those covered with leather, which are high in price. These rings are moulded in exactly the form required, and they are much more flexible than leather ones, even of the very best quality.

India-rubber pipes, by reason of the multiplicity of their uses, and the diversity of their composition, form an important branch of manufacture. Those that are used for gas, acids, &c., and have to bear only a feeble pressure, are made of pure rubber by simply rolling a strip of paste round a mandrel; the soldering is easily effected by contact merely, and is consolidated by the pressure of two small blades, worked by hand. To prevent the paste from adhering to the mandrel, care is taken to dust it over first with powdered talc. Sometimes several strips are placed on the top of the other, the number being determined by the thickness of the pipe which is being made.

When the tubes are intended to be subjected to a certain pressure, they are consolidated by the insertion of one or more layers of cloth, the cohesion of which prevents the swelling of the pipe, the wearing away of the sides, or their rupture under extraordinary pressure. These pipes are generally formed as follows:—A round of india-rubber on the mandrel forms the first tube, over which a strip of cloth is rolled, done over with india-rubber by a calender; a fresh round of pure paste is followed by a second covering of cloth, and the operation is repeated according to the number of folds the pipe is intended to have. This number of folds depends on the diameter, and increases generally with it. The outer envelope is india-rubber. By increasing the rounds of cloth we obtain pipes capable of resisting the strongest pressure.

When a liquid has to be pumped up, it is necessary to guard against the crushing of the pipe, which the atmospheric pressure would inevitably cause. For this purpose a spiral is used, made of galvanized iron or copper, which is either simply placed in the interior of the tube or imbedded in the thick part of the rubber. Generally, the outer part of the tube is formed of coarse cloth, which serves as a protecting envelope, as these pipes are nearly always intended to be trailed on the ground. They are much used for fire-engines and pumping-engines.

All these kinds of tubes can only be vulcanized after they have been finished. They are placed on a vehicle which runs on rails, and run into a boiler 20 yards long, specially prepared for them.

I manufacture a particular kind of pipe, for which I have taken out a patent. It is made of tanned hemp, with an inside casing of india-rubber, and can be advantageously applied to a great number of uses. Being tanned, it is enabled to resist moisture, which has not the slightest effect upon it. It is much lighter than leather; consequently, in case of fire, a man can carry a much greater length, and can mount a ladder with it much more easily. The application of india-rubber sheets to the interior of these tubes prevents the infiltration of water into the pores of the tissue; it also prevents any loss of liquid, and protects them from injury. The resistance is very considerable. A diameter of $1\frac{1}{4}$ inches will bear a pressure of 15 atmospheres, and one of three-quarters of an inch will bear twice the amount of pressure. They are used for fire-engines, for brewery funnels, water-pipes, steam-pipes, &c.

* A. Stevart. "Results of Experiments on the Elasticity of Vulcanized India-Rubber."

ON THE DISTILLATION OF AMMONIA IN PRESENCE OF SULPHOCYANIDES.

By A. ESILMAK.

[From the *Chemical News.*]

The estimation of ammonia by distilling with caustic alkali a known weight of any ammoniacal salt into standard dilute sulphuric acid, and determination of the acid thus neutralized, is one of those processes which are exact enough to satisfy the requirements of the scientific chemist, and capable of such rapidity of execution as to make them invaluable in the hands of the manufacturing chemist. With carefully standardized test acid and alkali solutions, the results need not vary more than one or two tenths per cent. Having had occasion within the last two years to use this volumetric method daily in the examination of gas liquors, and sulphates of ammonia made from the washings of gas oxide of iron, my attention has several times been drawn to some little discrepancies cropping up in spite of the greatest care. In investigating the causes of these differences, the question arose—Does the sulphocyanide present in the sulphate of ammonia as well as in the gas liquor decompose during the distillation under the influence of the excess of alkali? Sulphocyanides submitted to dry distillation with slaked alkalies produce large quantities of ammonia, and it was possible that a similar reaction might take place, though more slowly, at the boiling temperature. To test this point, a solution of sulphate of ammonia containing 4 to 5 per cent. of sulphocyanide was made, and used for the following experiments, in which definite quantities were boiled for various lengths of time with different proportions in excess of the liberating alkali.

The following results were obtained:—

Using—	Per Cent. of Ammonia.
Caustic soda	23·87
"	24·19
Carbonate of soda	24·15
" "	23·64
Lime	23·47
"	23·80
"	23·608
"	23·97

These results were sufficiently contradictory to confirm my suspicions, and also to raise the doubt that only after the complete removal of the sulphocyanogen could the ammonia be distilled and correctly determined. Before attempting to settle this point, I resolved to make sure that there was no defect in the distilling apparatus. This consisted of a 21-ounce flask, generally filled half full, connected by glass and india-rubber tubing with two bottles, and so arranged that none of the boiling liquid in the flask would be sucked over during sudden condensation. Pure water coloured with delicate pink litmus solution was put into the bottles, and ammonia-free dilute caustic soda solution into the flask; the latter was then boiled into the former. After a few minutes ebullition there was a gradual change in the coloured liquid. It became purple, then blue, and there was thus seen to be manifestly something at fault. The small flask was replaced by a large one, into which the distilling liquid was poured, occupying about half an inch at the bottom; but on *slow* boiling the same result was obtained, and not only once but a dozen times. The interposition of a bulbed tube containing broken glass between the flask and bottles made no difference, thus showing that the alkali could not have been carried over mechanically. The same results were also obtained when milk of lime was employed in place of caustic soda, and yet neither of these alkalies could be found in the distillate. The anomaly, however, was soon explained. On substituting bent glass tubing in place of the glass and india-rubber found so convenient, and continuing the distillation, no alteration in the colour of the pink litmus solution was observed, even after long boiling, and a portion of the distillate subjected to Nessler's test gave no indications of ammonia. When the india-rubber tubing was used once more, the distillate gave a very decided colour to Nessler's solution.

Although I have not seen any published records of the absorbent powers of india-rubber tubing for ammonia, I can scarcely believe that it has so long escaped notice; and, considering its wide application, it may not be amiss in me to impress upon others the necessity of restricting its use to the utmost point consistent with flexibility in connecting apparatus. It is quite possible that the materials incorporated with the rubber during the manufacture, as gypsum, for example, may be the cause of the disturbance; but this point I have not examined.

Having then altered my connecting-tubes so as to employ a minimum of india-rubber, I made the following experiments to ascertain the extent of the decomposition of the sulphocyanogen during distillation with various alkalies. A solution of sulphate of ammonia containing 4 per cent. of sulphocyanogen was used. The results are as follows:—

Liberating Alkali.	Per Cent. of Ammonia.
Caustic soda	21·261
"	21·672
"	21·354
Caustic lime	20·883
"	20·990
Caustic magnesia	20·998
"	20·873
After separation of the sulphocyanogen as sulphocyanide of copper, and distillation with caustic soda	20·908

Another sample of sulphate of ammonia of similar composition gave—

By distillation with soda	22·08 per cent.
" magnesia	21·33 "

These results are sufficiently conclusive to show that decomposition of sulphocyanogen does take place when caustic soda is employed in liberating the ammonia; that the extent of error thus introduced is very appreciable; and that it can be eliminated by using caustic lime or magnesia in place of soda. I prefer lime, as magnesia, from its great insolubility, is slow in its action.

GAS EXPLOSION AT ROCHESTER.—A violent explosion of gas occurred soon after ten o'clock on Sunday week, at a house in Rochester occupied by a pawnbroker. There was an escape of gas in the front room of the first floor, and a young man who was in charge of the house took a light to ascertain what was amiss. A violent explosion ensued; part of the ceiling was forced down, the windows were blown into the street, and several shutters of the shop were hurled on to the pavement. The roadway was covered with fragments of window-frames and broken glass. Fortunately, the young man was not seriously hurt, and no one in the street was injured.

THE CONSTRUCTION OF GAS-WORKS.

At the Seventh Ordinary Meeting of the Institution of Civil Engineers, on Tuesday evening, Jan. 12—Mr. THOMAS E. HARRISON, president, in the chair—a paper was read by Mr. HARRY E. JONES, Assoc. Inst. C.E., on "The Construction of Gas-Works."

The subject of the paper was the consideration of what types of gas-making appliances were cheapest in construction as well as most efficient in action. The site should be selected chiefly for facilities in receiving and delivering material by rail or water. Every section, of which the most important was the retort-house with its contents, should be so constructed as to admit of extension without involving destruction. Opinions were divided whether the house was best with the retorts upon the ground level or on a "stage." The author had come to the conclusion that, when there was a ready sale for coke from the ground floor of the stage-houses as fast as it was made, a saving of labour, as compared with a ground-floor house, was effected, but not when the coke had to be stacked outside the house. A comparison of the manufacturing wages for the year 1873 of those metropolitan gas companies employing stage retort-houses and others using ground-floor houses, showed a saving by the former of ·48d. per 1000 cubic feet of gas sold. On the other hand, the cost of a stage retort-house, complete with retorts and fittings, and having suitable coal-stores, ranged from double to three times that of the simpler form of house for the same capability of production. The cost of the stage house was not less than from £16,000 to £18,000 per million cubic feet of gas produced per diem, or £8000 more than the ground-floor house. This would require, at the usual rate of interest, £800 per year, to which must be added the wear and tear at £2 per cent.—£160—making an annual extra charge upon working of £960. Allowing a deduction for extra labour on coke, the net saving was probably about ¼d. per 1000 cubic feet of gas. Supposing the maximum annual make to be 203,670,000 cubic feet, the saving on this quantity would amount to £282, which fell short of the extra annual charge by £678. Of the various retorts, the round form was undoubtedly the strongest and most enduring, and the oval the weakest; but the latter and the D shape were capable of working heavier proportional charges. The greater the number of retorts within one oven, and worked by one furnace, the greater the economy in fuel; as the surface of the enclosing walls, and *pro tanto* the loss of heat by radiation, were thereby reduced in proportion to the capacity for carbonization.

The effect of the high temperature at which coal was best carbonized was that, through the dip-pipes, the liquid contents of the hydraulic main were subjected to a continuous blast of gas from the white-hot sides of the retort. The stagnant tar, therefore, was boiled until its fluidity was gone. This produced pressure on the retort, causing loss through its pores, active deposition of carbon on its sides, and a constant choking of the ascension-pipe, near the mouthpiece especially, but more or less throughout its length, occasionally even implicating the H-pipe. There were many propositions to remedy these stoppages, and to do away with the hydraulic seal altogether. Of these, none would bear comparison for safety and effectiveness with the contrivance they aimed at displacing. The fault lay not in the hydraulic seal, but in the condition of its contents. The problem to be solved was how to keep the tar in the hydraulic main sufficiently fluid. The author found that an extra length of 8 feet of ascension and dip pipe, interposed between the retort and the hydraulic main, reduced the average temperature within the latter 36°. The deposit of pitch then ceased, and no further stoppages were experienced. There was little prospect of the intermittent process of carbonizing by manual labour being superseded by a continuous system actuated by steam power. None of the suggestions with this aim had justified their adoption on a working scale. Even the modified advantage of substituting steam power for manual labour seemed difficult of realization. Of this last, a thorough trial at Beckton had ended in its being for the present abandoned. The form of the condenser was immaterial so long as it was extensive enough, and did not separate the tar and liquor until the desired minimum temperature was reached. This should be near that of the atmosphere, even in the depth of winter, to avoid condensation of naphthaline, and loss of illuminating power in distribution. Of exhausters, the best, known as Beales's, had a rotary action. The washer and scrubber were next considered. These removed the ammonia, and such carbonic acid and sulphuretted hydrogen as would combine with the water and ammoniacal liquor used. Washers were generally shallow, oblong boxes, with cellular passages sealed by liquor or water, through which the gas was forced or drawn in fine streams. They gave a more intimate contact between the gas and the liquid than the scrubber, but were open to the objection that they caused back pressure. The scrubber, on the other hand, did not work well with small quantities of water, owing to the difficulty of ensuring equal distribution throughout its contents as commonly arranged. The scrubber was usually a cylinder, sometimes of extreme height, filled with porous material, by means of which the gas was washed by ammoniacal liquor or by water. By these, and with reasonable care and entire exclusion of tar, fair results were obtained. The materials used in scrubbers were in themselves inert, and were subject to have their interstices filled by a deposit of tarry oil. The liquor was thus diverted, and established for itself distinct channels, the gas meanwhile taking separate routes through the mass of material, avoiding the contact desired. This defect was necessarily magnified in lofty scrubbers, where the liquor had to descend from 50 to 70 feet. For the removal of ammonia, and at the same time to procure liquor of great strength, the author preferred scrubbers on a principle somewhat like that of the Coffey still. They were boxes of iron 20 feet high, 10 feet long, and 2 feet wide internally, with longitudinal shelves of unwrought fir, 6 inches apart, extending alternately from one end of the box to within 6 inches of the other, so as to cause the water to traverse the whole length of one shelf before it descended to the next, meeting the gas flowing in a flat, wide current in the opposite direction. The washer or scrubber was an apparatus of great value, inasmuch as all purifying agents acted more energetically in a liquid form, and were cheaply and easily brought into contact with the gas without demanding manual labour.

The purifiers should be capable of holding such a bulk of material that its interstices might contain a considerable volume of gas, and reduce the velocity with which the latter were passed in contact with it. The capacity should vary with the density of the purifying material. With either lime or oxide of iron there was a sacrifice of economy whenever the capacity of the purifiers, at any one time acting on the gas, was less than 4 cubic feet per 1000 feet of gas purified per diem, and that so disposed that the aggregate depth of the material in lineal feet was not more than 1-20th of the area in square feet. The author preferred to have on the outlet of each purifier to the clean gas main a valve sealed with fresh water. The great question of the day in purification was to remove the bisulphide of carbon. It had been ascertained that when sufficiently long in contact with an alkaline sulphide, this impurity was reacted upon. If, therefore, caustic alkali was submitted to gas foul with sulphuretted hydrogen, but free from carbonic acid, a sulphide was obtained, which reacted on the bisulphide of carbon. In this condition, however, lay the difficulty. Although alkaline bases had a higher affinity for carbonic acid than for sulphuretted hydrogen, and were therefore capable of removing it preparatory to the process before indicated, their affinity for the latter body was considerable, and it was not easy to prevent sulphuretted hydrogen being arrested, so as to vitiate the formation of sufficient alkaline sulphide in the succeeding purifier for the extraction of the bisulphide. From this cause results of an apparently eccentric and conflicting character were occasionally obtained. Absolute purity from bisulphide of carbon had not yet been attained, but so far this body appeared to be capable of restraint within unobjectionable limits.

Gasholders with their tanks were a portion of the plant which, next to retort-houses, figured most prominently in a company's capital account, and therefore afforded the engineer scope for the exercise of economy in construction. The holders should be telescopic, developing a double storeage capacity for the single expense in tank. The proportion of the height of the holder to its diameter should be regulated by the maximum amount of pressure required, subject to the value of the ground occupied. At the same time a height in each lift of less than one-fifth of the diameter was undesirable. Gasholders might be light in weight without sacrifice to their efficiency. The iron sheeting need not be thicker than No. 12 Birmingham wire gauge, weighing 4·38 lbs. per square foot. The pressure of the gas within assisted in maintaining their shape; and the sides needed little framing beyond good top and bottom rings, where the guide rollers were attached, and a sufficient number of uprights to sustain the weight of the top sheets. No truss framing was required, as the sheeting might rest on a cheap scaffolding of wood when the holder was landed, and would be sufficiently sustained by the gas within when afloat. The author had frequently been inside gasholders inflated with air, and had noticed the trussing hanging from the distended sheeting of the top, being practically a burden instead of a support. However perfectly a roof framing might be adjusted, when the holder was lifted by internal pressure, its members remained rigid while the sheeting stretched, and never again fitted the framing. At ordinary rates of iron, gasholders of the kind described could be constructed, for sizes below a capacity of 300,000 cubic feet, at about £13 per 1000 cubic feet; above that size the cost diminished with the increase of capacity, until at 2 million cubic feet £8 to £10 per 1000 cubic feet represented the cost. A holder for 2,350,000 cubic feet, which had a slight truss in the top, had been executed in 1866 for the Commercial Gas Company at so low a rate as £5 13s. per 1000 cubic feet. The external guide framing should be strong enough to sustain the inflated holder, even under the influence of a hurricane. At the same time, the constituent metal could be disposed in forms developing, far more than was commonly seen, the strength due to the weight of iron composing its members. The author had been impressed by the elegance and general fitness of the form to the purpose, exhibited by the guide framings of the original gasholders at the Bow Common station of the Chartered Gas Company, designed by Mr. Croll, Assoc. Inst. C.E. Gasholder tanks had usually, where soil permitted, been built of either brickwork or masonry, well puddled round the walls and over the bottom. Portland cement concrete, in some cases without puddle, had been adopted latterly, notably by Mr. Livesey, M. Inst. C.E. Brick tanks, puddled, ordinarily cost £6 10s. per 1000 cubic feet of capacity of the telescoped holder fitted in them, though the cost of the tank for the Commercial Company's holder was as low as £5 5s. per 1000 cubic feet. A concrete tank constructed by Mr. Livesey had been completed at a saving of £2 11s. per 1000 cubic feet, as compared with a brick tank of the same capacity.

The governor or regulator, as usually constructed, had a conical valve suspended in the upward stream of gas, actuated by a balanced gasholder, and was open to the objection that, having a flat base to the cone, the latter was disturbed and acted upon by the current of gas, much as a loosely-fitting piston would be, and therefore required constant readjusting. To obviate this irregularity, a large throttle-valve had been adapted for the purpose, which worked admirably. The ordinary pressure upon the system of mains ranged from between 1·0 inch and 1·5 inch head of water between sunset and midnight to 0·6 inch or 0·8 inch for the rest of the 24 hours. To secure economical distribution, the regulation of the pressure in the mains at all parts of the system should be under complete control; that pressure should be, as far as possible, uniform with the initial pressure, or under a constant rate of variation from it. These conditions were best fulfilled by distributing the gas from a mean level between the extremes, having high and low pressure mains for supplying the lower and higher portions of the district, right and left, avoiding all duplication in their course, and the consequent multiplication of joints and surfaces of metal.

In settling the proportions of length and diameter in the arterial and subsidiary mains, the experience of the qualified engineer would be the best guide. Mr. Hawksley, Past President of the Institute of Civil Engineers, had rendered invaluable service by investigating the laws which governed the transmission of aëriform fluids through cylindrical pipes, and by determining, from experiment on a practical scale, the co-efficient of friction for coal gas. The author was satisfied that mains and services could be laid practically free from leakage. If the condition of mains and services as laid could be preserved, no doubt leakage would practically disappear. Unfortunately, however, mains once laid were subject to disturbing influences, such as decay of material, subsidence of the soil wherein the pipes reposed, and, in large towns, the vibration due to heavy street traffic, as well as to contiguous railways. There was no satisfactory reason, however, for the high average per centage throughout the country. In the district of the Ratcliff Gas Company, which surrounded the docks, and was consequently subject to vibration from the heaviest traffic, the total per centage of unaccounted-for gas, including other losses besides leakage, had for two years been within 6 per cent.; and the returns from various parts of the country indicated improvement in this direction.

As an argument for the importance of cheap construction, it was pointed out that the maximum demand for gas extended only for about three weeks in the year, falling at Midsummer by as much as two-thirds. The anomalous and varying rates at which gas was sold, not only throughout the country, but even within the limits of London, was explained by the varying proportions between the quantity of gas manufactured in each case and the amount of capital employed. The difference in the charge to the consumer was absorbed in meeting the higher charge for dividend which the company with the larger proportion of capital required. This difference no concentration or amalgamation could overcome; and the lesson taught to the engineer should be the importance of endeavouring, as far as in him lay, to develop the highest efficiency from the works with the lowest expenditure of capital.

The discussion of the paper was reserved for the meeting this evening.

At the second monthly ballot for the session, Mr. Edward Bates, sub-Engineer to the Continental Union and European Gas Companies, was (amongst others) elected an associate, and it was announced that the council had recently transferred Mr. James Blackburn, Chief Engineer to the Oriental Gas Company, Calcutta, from the class of associate to that of member.

EDINBURGH WATER SUPPLY.—The superintendent of works reported to the meeting of Water Trustees, on the 14th inst., that during the month of December last the number of apparatus examined for checking waste was 16,045, of which 15,195 were found good, and 850 faulty or in want of repair. The number of houses inspected was 5246, and the waste of water checked equal to 52½ gallons per minute. The quantity of water sent into the city and districts was equal to 900·92 cubic feet per minute, which represents a daily supply of 8,084,928 gallons, affording 30 gallons per head per day to the estimated population of 270,300. The average supply to Edinburgh was 30·42 gallons per head per day to a population of 216,668. The average supply to Leith was 28·34 gallons per head per day to a population of 47,940, and the average supply to Portobello was 24 gallons per head per day to a population of 5712. During the prevalence of the recent frost, the only case of freezing of any of the trustees main-pipes was that of a 3-inch sub-main, but a very great number of private service-pipes were frozen throughout the city and districts, where exposed or insufficiently protected. Especially in suburban villa residences, great inconvenience was felt, the service-pipes being laid too near the surface—in many cases not more than six inches deep—while the frost penetrated the ground to the depth of 18 or 19 inches.

SANITARY PROGRESS.

EXTRACTS FROM AN ADDRESS TO THE CHEMICAL SECTION OF THE GLASGOW PHILOSOPHICAL SOCIETY,

By the PRESIDENT, EDWARD C. C. STANFORD, F.C.S., Nov. 9, 1874.

[From the *Journal of the Philosophical Society of Glasgow.*]

Gentlemen,—Since I last had the honour of addressing you from this chair, we have sustained a severe loss. Only a week since, Dr. Thomas Anderson departed this life. Educated in the University of Edinburgh, where he graduated as M.D., he afterwards studied under Berzelius at Stockholm, and under Liebig at Giessen. He did full justice to the teaching of these great chemists, and was author of a number of most important researches. Amongst these, his researches on some of the opium bases, and particularly those on the bases of coal tar and bone oil, earned for him a high reputation amongst European chemists. Those only who have experienced the difficulties and dangers attending such an exhaustive research as that of Anderson on the coal tar bases and bone oil bases, can appreciate rightly the enormous amount of work involved. Mansfield had lost his life in a similar research; and any chemist who wishes to subject himself to penance should take up a research on some kind of tar. He will not only provide himself with work for life, but he will find that his friends prefer to keep him at a distance. Few who have not studied these researches would understand their practical value; but to those who would apply the *cui bono* test, I would remark that Anderson, though not the actual discoverer, was the first to fully investigate anthracene, and under the name of oxanthracene, he actually described that remarkable oxidized derivative of anthracene now known as anthraquinone. This substance is the starting-point in the manufacture of alizarine—the colouring principle of madder—a vegetable colour which has so long defied the efforts of chemists to reproduce it in the laboratory. So that Anderson may be really said to have laid the foundation of one of the largest and most scientific of chemical manufactures.

His numerous researches earned him the distinction of Fellow of the Royal Society, and in 1852 he was appointed Regius Professor of Chemistry in the University of Glasgow, having previously been appointed chemist to the Highland and Agricultural Society. These appointments he held to within a short period of his death. He will be mourned by all chemists, as his fame was world wide; but we ought to be the chief mourners. Some of my colleagues around me will remember that we did not organize this section without considerable difficulty and even opposition in some quarters where we least expected it. Knowing the want of a chemical society in a city like this, where almost every known chemical manufacture is represented, we were much encouraged by the warm co-operation and assistance of the late Dr. Anderson.

We have been pained to see him the last year or two becoming enfeebled. He was our first president: and, whilst all Europe mourns a distinguished and accomplished chemist, we miss his friendly advice and courteous demeanour to one and all of us, who mourn the man even more than the chemist lost.

I may congratulate you on the increasing prosperity of this section. We have largely assisted the membership of the parent society, and now there are no less than three other sections added, resulting—as some day I hope it may—in gathering all the scientific societies in Glasgow under one roof, and their proceedings into one book; and until that is accomplished, the "Proceedings of the Philosophical Society of Glasgow" will not properly represent the science of this city. I would wish to add that the reporting of the discussions in this and other sections is open to great improvement. It is often the most important part of the meeting, and we have not the means of rendering it.

The recent meeting here of the Social Science Association has, by the appointment of Dr. Lyon Playfair as the president of the Health Section, given considerable prominence to the chemistry of health. The address of that eminent chemist was, as might have been expected, a masterpiece. In my opinion it is quite time the aid of chemical research should be called in to assist in this subject. It is remarkable even now how little we know chemically of the air we breathe, the soil we live upon, the water we drink, and the food we eat. The chemistry of hygiene is quite in its infancy.

Pettenkofer avers that in all healthy houses we virtually live outdoors, the walls being largely pervious to air, and he shows that where these walls are saturated with water, as must often happen with the porous sandstone houses of this city, they become impervious to air, and therefore unhealthy. It has been found that to keep the air pure in houses a ventilation is necessary of more than 2100 cubic feet per head per hour. This appears enormous, when it is remembered that an individual does not inhale and exhale more than 18 cubic feet of air per hour.

When the Model Hospital la Riboisière was erected in the Faubourg Poissonnière, it was furnished with artificial ventilation; 700 cubic feet per head per hour was adjudged ample for all requirements. At this rate the air in the wards was quite foul, and it was not until 2120 cubic feet were used that the hospital was pure. The rate now recommended is as follows:—

	Per Head per Hour.
In hospitals for ordinary cases	2120 to 2470 cubic feet.
" " wounded	3530 "
" " epidemics	5300 "

Pettenkofer shows that most of the ventilation of a room is through the walls, and we are apt to forget how extremely porous to gases these *septa* generally are. He reckons the average rate per square yard at about 7 cubic feet, or 43 gallons per hour.

He employs carbonic acid measurements in these researches, and the large wall ventilation shows that smaller houses have more ventilation, in proportion to their size, than large ones. In earth hovels the ventilation is about 14 cubic feet per hour, or double the average rate, owing to the greater porosity.

His researches generally are most interesting; and when we consider the number of germs of disease often in the air, we must confess that our air chemistry is sadly at fault.

Turning now to the soil we dwell on, we should not forget that our houses are practically, if well drained, built on air, or rather on soil full of air, and we know if this soil be full of water our health suffers. The porosity of soil to air and gases is so remarkable that Pettenkofer relates cases of "persons poisoned and killed by gas which had to travel for 20 feet under the street, and then through the foundations, cellar-vaults, and flooring of the ground-floor rooms." The porosity of the soil has an important effect on the decomposition of corpses; it has been shown that in a porous soil the body rapidly decays, whereas in a clay soil it is preserved for long periods; and it shows the necessity for proper investigation before deciding on sites for cemeteries, unless we are to make our relations into gas, and thus "live by the light of our ancestors," as Dr. Lyon Playfair has suggested.

Turning to the water we drink, there is still, unfortunately, great difference of opinion as to the proper composition of a good drinking water. The term "previous sewage contamination," which has been introduced, is misleading, because some of the deep-well waters will show large amounts of nitrates without a trace of organic matter; and it does not follow that these nitrates have been derived from sewage.

[As regards nitrification, the PRESIDENT, in a subsequent part of his address, spoke as follows:—

We know very little about the real causes of nitrification. I have shown that neither charcoal nor earth oxidize ordinary nitrogenous organic matter, and that the latter simply produces decay and evolution of ammonia. In solution, the action of various filtering media on nitrogenous organic matter is very imperfectly understood. I shall have some experiments on this subject to bring before you during the session; but I would only premise here that filtration through porous bodies tends to convert the nitrogen into ammonia rather than, as generally supposed, into nitric acid.]

On the other hand, our own celebrated Loch Katrine water contains nearly as much organic matter as that of the best London supply; and there is no doubt, to be entirely free from all suspicion, this organic matter should be separated by filtration.

Professor Wanklyn's method of water analysis has given us great facilities in easily assessing the value of a drinking water, and his manual on the subject should be in the hands of all analysts; for the analysis of drinking water is now constantly required.

The amount of ignorance which generally prevails on this subject is extraordinary; it is impossible to convince healthy villagers that they have long been in the habit of drinking a dangerous water—and the analyst must always expect great opposition to his statements. In one case in Scotland where a good water supply was voted against, I took the trouble to inquire the reasons of two voters. One said the engineer knew nothing about it, because he had got one 6-inch pipe to supply two 4-inch pipes, which was impossible; the other said that the engineer could not have laid down the pipes right, because he had not measured the ground, forgetting that the Ordnance map very accurately supplied him with the data. How can such people judge of the analysis of a water?

The question of water supply naturally leads us to the consideration of that supply after our houses have fouled it into sewage. The president of the Health Section of the Social Science Meeting summed up the processes for dealing with this question into the one old law, "Wash and be clean." This is applied to individuals and to houses; as to manufactories, he advocates another law, "Thou shalt not pollute rivers"—thus evidently advocating interception. I have always been strongly of opinion that these two laws must some day be enforced upon us. If we have only to deal with the water supply before and after it leaves our houses, we deal with a definite fixed quantity so comparatively small that it is easily dealt with. At present, however, the sewage of towns contains also that very variable item, the rainfall; and whenever this has to be included, it upsets all systems of filtration, irrigation, &c., because in time of floods it must be run to the nearest river. If the water-closet system is to be continued, it must be carried out in a separate system of impervious sewers; and if it is to be utilized, that result must be attained before the assistance of chemists is called in.

As long as the value of the material to be utilized is only one penny per ton, we must leave the towns to the tender but expensive mercies of the engineer. As for irrigation, farmers in the west of Scotland do not, as a rule, complain of want of water, and, as far as I know, would prefer their manure dry—certainly not in that extraordinary state of dilution which characterizes the Glasgow sewage, which is only about two-thirds the average value.

Bad as our river is, we have had more processes brought before the authorities here than anywhere else; three of these are at present little known elsewhere. I allude to Mr. Chapman's method of utilizing the urine of the city, to the Hoey limited water-closet system, and to the carbon closet system. An interesting report on these processes, by Dr. Wallace, has been published by the Glasgow Police Board. All these processes are those of interception, and are all steps in advance, because all are utilizing what has hitherto been waste and polluting material. Any method of keeping valuable pollution out of the sewers ought to be encouraged, because by so much it lessens the difficulty. The question will probably ultimately resolve itself into this—that all polluting material must be kept out of the sewers, manufacturers must look after their own pollutions, and householders after theirs, the town looking after the rainfall and streets. Taken at the outlet, the question is extremely difficult; taken at the house, it is easy; and house-to-house purification may become the real solution of the difficulty.

Before leaving the subject of sewage, I would say a few words on disinfection; the Public appear to me to be altogether on the wrong tack. Chloride of lime and carbolic acid are making our cities everywhere offensive. Both these substances act well if concentrated; they act like the clear, sharp cut of the surgeon's knife, but they do not bear dilution. Both substances when dilute have been found actually to favour the growth of germs, and it cannot be too generally known that the universal use of these substances to overcome bad smells is simply substituting one stink for another. There is nothing more difficult than the purification of infected air. A good disinfectant should not itself foul the air it pretends to purify. The only true way to disinfect is to prevent decomposition. We have several old antiseptics which ought not to be forgotten. Dr. Angus Smith has shown that common salt is much cheaper and better than these popular and odoriferous remedies. I have strongly urged the use of chloride of calcium for this purpose. It is the cheapest of all disinfectants, and could be got in enormous quantities.

The food question leads us to the consideration of the Adulteration of Food Act. This has given rise to a large number of appointments to chemists as local analysts. Unfortunately, our science has not hitherto come well out of the sudden demand on it. In the first place, the appointments were so numerous that we had not the men; and there is no doubt that our processes for the detection of adulterations in food were very crude and immature. These, however, are merely temporary difficulties. Wanklyn, in his series of food researches, has shown that milk, tea, coffee, and cocoa can be accurately tested; but these are but a small portion of what comes under the public analyst's attention. The position not only requires high analytical ability, but a large knowledge of the trades in food products.

The subject of commercial analysis has been brought before you during the past session. The great discrepancies between different analysts, which have given rise to the very objectionable titles of "high and low chemists," have been a scandal to our science. With a view of making some reform, we agreed to petition the British Association to appoint a committee to inquire into the methods of testing potash salts, and phosphates, those being the substances in which we had noticed the greatest variation, and, if possible, arrive at standard processes of general application, and agree as to statement of analytical results. We applied also to the Newcastle Chemical Society to support us in the application. They held a special meeting on the subject, and warmly supported us, adding in their resolution the following substances—copper, soda, and sulphur. Showing how strongly they felt in that large centre of manufacturing chemistry, they also passed the following resolution:—"And that this society is of opinion that the sub-committee suggested might also usefully inquire into the question of instituting a professional examination for a diploma, without which no person should be legally qualified as a public analyst." This resolution was soon after given effect to in a meeting of public analysts held in London, under the presidency of Dr. Redwood, and where resolutions were passed almost identical. These chemists had been roused to action by the suggestion of the committee on adulteration, that the Inland Revenue Laboratory should be the ultimate court of appeal in disputed cases. The Adulteration of Food Act has done much good; and when it is, as it will be, regulated by the analyses of accomplished chemists, working by accurate chemical processes, and not by microscopic medical men, it will be a great boon to the nation. The British Association appointed a committee with a grant of £10 to meet our wishes, and inquire into potash salts, and superphosphates.

The committee consists of Dr. Dewar, Messrs. Fletcher, Allen, and Stanford, with power to add to their number—Mr. Allen being secretary. We have already received several letters showing how much such a committee was required, and we hope before next year to report at any rate on the processes usually adopted.

EXPERIMENTS ON THE REFLECTION OF SOUND FROM FLAMES AND HEATED GASES.

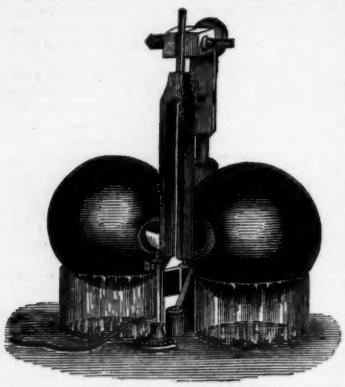
PAPER No. 7.—RESEARCHES IN ACOUSTICS. By ALFRED M. MAYER.

[From the *American Journal of Science and Arts.*]

The reading of the recent interesting research of Professor Tyndall on "Experimental Demonstrations of the Stoppage of Sound by Partial Reflections in a non-Homogenous Atmosphere" (Pro. Roy. Soc., Jan., 1874; *Nature*, Jan. 29, Feb. 5), and of the subsequent paper by Mr. Cottrell, "On the Division of a Sound-Wave by a Layer of Flame or Heated Gas into a Reflected and a Transmitted Wave" (Pro. Roy. Soc., Feb. 12, 1874), caused me to turn my attention to the experimental illustration of the reflection of sonorous vibrations from flames, heated gases, and from sheets of cold gases and vapours.

The following experiments are of easy execution, and show in a marked manner the reflecting powers of sheets of flame and heated gas, and even serve to give approximate measures of these reflecting powers.

Take two similar resonators and place the planes of their mouths at a right angle; then in this angle firmly fix the fork corresponding to the resonators, so that the broad face of one of its prongs faces the mouth of one resonator, while the space between the prongs faces the mouth of the other resonator. (See the figure.) By trial the two planes of the fork are placed at such distances from the resonators that complete interference of the vibrations issuing from their mouths is obtained, and the only sound that reaches the ear is the faint sound given by the fork's action on the air outside the angle included by the mouths of the resonators. If, in these circumstances, we close the mouth of either resonator with a piece of cardboard, the open resonator will strongly reinforce the sound of the fork. If we now also cover the mouth of the latter resonator with a piece of cardboard, we shall again have silence. Also, if we substitute for one of the pieces of cardboard a slip of stout glazed note paper, the same result is obtained. But if we replace the piece of note paper by a similar piece of French tracing paper, a faint sound issues from the resonator so covered, because the tracing paper is sufficiently permeable to sonorous vibrations to permit the resonator to slightly reinforce the sound of the fork. This reinforcement becomes greater if we substitute for the tracing paper a piece of tissue paper—such as is used in printed books to cover steel engravings—and a yet greater reinforcement is produced when we put in the place of the tissue paper a piece of the soft, loosely woven paper which is used by French instrument makers for the inner wrapping of their packed wares. I thus obtained a graded series of substances, more and more permeable to sonorous vibrations.



I again obtained neutralization, by interference, with the mouths of the resonators open, and then screened the mouth of one of them with a bat's-wing coal gas flame. The vibrations issuing from the resonators were now no longer neutralized, but the vibrations from the uncovered resonator had a great ascendancy over the other, so that a strong sound issued from it. I now tried to destroy this superiority by screening its mouth successively with the graded series of paper screens. The loose soft paper was not equal to it; nor was the tissue paper; but the tracing paper just equalled the effect of the gas flame in guarding the mouth of the resonator from the entrance of sonorous vibrations. On lowering the gas flame, so that its top luminous border was just below the mouth of the resonator—and therefore only a sheet of heated air ascended across the latter—the balance of the tissue paper against the hot gases and vapour remained unimpaired. Thus it appears that the reflecting power of a sheet of coal gas flame or of a sheet of the heated carbonic acid and vapour of water just above it, exactly equals, in the above described circumstances, the reflecting power of tracing paper.

I have also found that the passage of a sheet of cold coal gas across the mouth of the resonator was sufficient to destroy the balance of the interference, and caused a faint sound to issue from the other resonator; a similar effect, and nearly equal in intensity, was obtained with a sheet of cold carbonic acid gas; while cold, dry hydrogen closed the mouth of the resonator more effectively than either of the above gases, but was far inferior in this shielding action to the sheet of heated gases above the bat's-wing gas flame. I attempted to get a rough measure of the "acoustic opacity" of hydrogen, but could find no substance sufficiently permeable to balance it, except a sheet of rather fine wire gauze.

We should not place too much confidence in measures of the reflecting power of surfaces made by the method just described, and which I have used merely to give approximations of the reflecting powers of the above-named gaseous sheets; for the substance which closes the mouth of the resonator may allow a considerable portion of the sonorous vibrations to enter the latter, and yet the resonator may not be able to reinforce the sound by reason of its being thus thrown out of tune with the fork, by an unyielding surface closing its aperture. Thus, a sheet of thick note paper prevents resonance as effectively as a thick piece of Bristol board, or a plate of metal; yet we know well that these substances have very different powers to reflect sonorous vibrations.

As a flat coal gas flame equals a piece of tracing paper in reflecting sonorous vibrations, it follows that we can substitute the former for the latter in all experiments where the presence of the paper produces, by its reflecting power, an alteration in intensity or in pitch. Thus, if we vibrate a fork before the mouth of a resonator while the nipple of the latter is open, we obtain a far inferior reinforcement to what takes place when the nipple is closed. Now, the nipple can be partly closed with a gas flame or a sheet of heated air. Thus, alternately closing and opening the nipple of an Ut_1 resonator with the flame of a Bunsen burner, gives excellent results.* The reflecting power of a bat's-wing flame is also well shown by successively closing and opening the mouth of any resonant box of forks in the octave Ut_1 to Ut_2. Also, if the plug be taken out of the ends of closed organ-pipes, and these pipes be placed horizontally, the reflecting effect of the flame is heard when the latter is passed forward and backward across the open ends of the pipes, while the ear is placed in the axes of the pipes. The simplest method, however, is to sound the fork (either continuously by electro-magnetism, or by a bow) in front of its resonator, and successively to close and open the mouth of the latter with a flame or sheets of heated gas, or of cold vapours or gases.

The contemplation of these experiments naturally calls up the question—Is the action of the flame due entirely to reflection? May it not also absorb part of the sonorous vibrations, as in the analogous phenomena of the reflection of light? If the intensity of the sonorous vibrations, which have traversed the flame, equal the intensity of the vibrations which impinged on the flame, minus the intensity of those which were reflected from the flame, then there is no absorption of these vibrations by the flame; but if this equality does not exist, then there is absorption in the flame; and this means that the flame is heated by the sonorous vibrations, which enter the flame as sonorous vibrations, but issue from the flame as heat vibrations. It thus, at first, appears that the absorption of the sonorous vibrations might be detected by their production of an increase in the temperature of the flame; just as sonorous vibrations are absorbed by caoutchouc and reappear as heat in this substance.

In the following manner I have recently made experiments in the direction of determining the equivalent of a given sonorous aërial vibration in fraction of a Joule's unit of 772 foot-pounds. I stretched between the prongs of an Ut_3 tuning-fork a piece of sheet caoutchouc, 100th of an inch in thickness, and about half an inch broad. The effect of this rubber on the vibrating fork is rapidly to extinguish its vibrations, while the rubber itself is heated; and if a fork be vibrated continuously by one and the same force when the rubber is stretched on it, then, when it is taken off, the aërial vibrations produced by the fork are far more intense in the latter circumstances than in the former. By a method described by me in this *Journal*, Feb., 1871, I measured the relative intensities of the aërial vibrations in these two conditions of vibration. The sheet of caoutchouc was enclosed in a compound thermo-battery, and the fork vibrated during a known interval; the rubber was heated by the vibrations which would have appeared as sonorous vibrations if the rubber had been removed from the fork. The amount of heat given to the caoutchouc was accurately determined by the deflections of a Thomson reflecting galvanometer connected with the thermo-battery; and by knowing the interval during which the fork vibrated, the amount of heat given to the caoutchouc during this interval, and the equivalent of the heated rubber in water, I calculated the intensity of the sonorous vibrations in terms of a thermal unit, from which I at once obtained the value of the sonorous aërial vibrations when the fork was not heating the rubber; in other words, when it vibrated freely. I thus found that the sonorous aërial vibrations, produced during ten seconds, by an Ut_3 fork placed in front of its resonator, equalled about the 100,000th of a Joule's unit—that is, they can be expressed in the work done in lifting 54 grs. one foot high. This quantity of heat, which is equal to the heating of one pound of water 100,000th of a degree Fahr., expressed the amount by which the gas flame would be heated if it absorbed all of the sonorous vibrations issuing from the Ut_3 resonator. But this is such a small fraction of the entire heat in the flame, that it is far within the actual fluctuations in its temperature, and even if the flame were constant in temperature this small increase could not be detected by any known thermometric method. We cannot, therefore, determine the amount of absorptive power of a flame, or of a sheet of heated air, for sonorous vibrations, by experiments on their increased temperatures when sonorous vibrations impinge on these bodies.

* In all of the experiments described in this paper care was taken that no heated air or gases entered the resonators, and thereby put them out of tune.

ON THE COMMERCIAL PREPARATION OF SULPHOCARBONATE OF POTASH.

By M. A. GÉLIS.

[Translated from the *Moniteur Scientifique.*]

Sulphocarbonate of potash was discovered by Berzelius in the year 1826, and the memoir containing an account of the discovery is to be found in the *Annales de Chimie et de Physique*, vol. xxxii., p. 60. In this memoir Berzelius does not confine his observations solely to sulphocarbonate of potash, but touches generally upon all the alkaline sulphocarbonates, earthy and metallic. He describes the nature of these substances, and gives directions as to their preparation; and though the details of his processes are necessarily somewhat abridged, they have been found to be sufficiently explicit for conveying a general idea of his method of proceeding, for since the time of their publication, persons who have had occasion to refer to the preparation of sulphocarbonate of potash have simply reproduced them.

Berzelius points out three methods of preparing sulphocarbonates generally, and notably the sulphocarbonate of potash. They are—

1. By the action of carbonic sulphide (sulphide of carbon) *in excess* upon hepar or liver of sulphur, or upon monosulphide of potassium, *in presence of alcohol.*

2. By the direct action of carbonic sulphide upon alkaline monosulphide, *in presence of water.*

3. By double decomposition, commencing with the sulphocarbonates of baryta and lime.

I will now proceed to examine each of these processes separately.

First Process.—In the memoir published by Berzelius in 1826, he gave the preference to this process for the preparation of sulphocarbonate of potash, but abandoned it later. It was described as follows:—"The best method of obtaining sulphocarbonate of potash consists in saturating a solution of hepar in alcohol by means of an excess of carbonic sulphide. I have attempted to treat carburet of sulphur with solutions of hypersulphurets of alkaline and earthy metals in alcohol. The hypersulphurets of earthy metals simply give solutions of both these substances. The water separates the carbonic sulphide, or rather it is volatilized in process of evaporation, and the residue is the hypersulphuret. But when the alkaline hypersulphurets are saturated to a certain point with carbonic sulphide, the solution becomes cloudy, and deposits sulphur, although in a much smaller quantity than the alkaline metal ought to yield. In this operation the solution of potassium divides itself into three layers, the lowest being a highly concentrated solution of potassic sulphocarbonate in water, the intermediate layer being formed of an excess of carbonic sulphide, and the upper one consisting of an alcoholic solution saturated with hypersulphuret, sulphocarbonate, and carbonic sulphide, this last being susceptible of precipitation by water. . . . The solution, of a deep red colour, which collects at the bottom of the vessel, being evaporated, at 30° C., until it presents the consistence of syrup, gives off a yellow crystalline salt, which quickly moistens on exposure to the atmosphere, and becomes liquid."

This salt is sulphocarbonate of potash, and the following are, according to Berzelius, its principal properties.

Dried at a temperature of 60° or 80° C., it loses its crystalline texture with its water of crystallization, and changes to a deeper colour, bordering upon red. When heated in a still, it gives off no volatile product, but becomes transformed into a liquid black mass, which is a mixture of carbon and tersulphuret of potassium. The sulphocarbonate of potassium is scarcely soluble in alcohol, is of red colour, has an hepatic flavour, but at the same time a trifle caustic, analogous to that of pepper, and recalling the flavour of sulphide of carbon. Exposed to atmospheric action, the aqueous solutions of sulphocarbonate of potash decompose rapidly when spread out, and the result is the formation of an oxicarbonate and a small proportion of sulphur. The concentrated solutions may be evaporated at a gentle heat without causing decomposition to any appreciable extent.

The method of preparing sulphocarbonate of potash above set forth was, as I have already observed, that which was first recommended by Berzelius, but afterwards rejected by him; for in his *Traité de Chimie*, which appeared several years later, he abandoned the use of polysulphurets, and replaced them by monosulphuret of potassium, obtained by reducing sulphate of potash by means of coal. In the Belgian edition of the work above referred to (vol. ii., p. 580), the motives which prompted this change are set forth as follows:—"The solutions of liver of sulphur in alcohol, to which is added sulphide of carbon, give rise to a sulphocarbonate, but they throw down their sulphur very imperfectly."

This was not the only modification the process underwent, for subsequently Berzelius abandoned the use of alcohol. In fact, the employment of that sub-

stance was not unattended with certain inconveniences; in the first place, its high price would cause it to be excluded as much as possible from manufacturing operations. Besides this, with sulphurous compounds, alcohol forms certain ethylic combinations which impart to it a disagreeable odour exceedingly difficult of removal, and this odour arises in a great measure from the production of considerable quantities of bisulphuret of ethyl.

By the abandonment of the use of alcohol and the polysulphurets, Berzelius entered at once upon his second process. A description of this process has already been given in the various treatises on chemistry which have from time to time appeared (notably in that by Berzelius, as well as in the work of MM. Pelouze and Fremy); but I will proceed to briefly summarize it.

Second Process.—This process consists in preparing sulphocarbonate of potash by the direct action of sulphide of carbon upon monosulphide of potassium in presence of water. This process is the simplest, and merits the attention of manufacturers. Its manipulation is easy, all that is required being to place in flasks equal parts of sulphide of carbon and monosulphide of potassium in process of dissolution in water, and having well secured their mouths, to leave them exposed to a temperature of 30° C. The sulphide of carbon then combines little by little with the base. In a general way an exposure for several days is required to complete this combination. The slowness of the reaction arises in a great measure from want of contact on the part of the reacting matters; but when operating on a large scale the reaction may easily be greatly accelerated by making use of well-arranged mixing apparatus.

I would just observe that this mode of preparation is in all respects similar to that employed for sulphocarbonate of ammonia, full details of which I published when I was engaged in the manufacture of that salt on a large scale, with a view to the production of sulphocyanides and of prussiate of potash. (See *Journal de Pharmacie et de Chimie*, vol. xxxix., p. 95.) It is upon this process that manufacturers should, in my opinion, rely for the economical production of sulphocarbonate of potash by the substitution of sulphide of potassium for sulphide of ammonium.

It has been asserted in various quarters that the preparation of monosulphide of potassium is attended with serious difficulties; but I do not know what has given rise to this assertion. It may, perhaps, be true when applied to minor operations, such, for example, as those carried on in laboratories, but it is certainly not so when it is a question of producing the monosulphide in large quantities. I have prepared some thousands of kilogrammes of this product, and can affirm that its manufacture is one of the simplest operations in the industry of chemical products.

Berzelius has truly observed that, whatever process may be employed, absolutely pure sulphocarbonates are only obtained with some difficulty. In fact, if monosulphide of potassium obtained by means of coal is used, the product always has a yellow tinge, owing to the presence of a little bisulphide. If, on the other hand, the monosulphide has been produced by the action of sulphuretted hydrogen upon caustic potash, the solution, though uncoloured, may contain subhydrate of sulphur. Now, the affinity of sulphide of carbon for these bodies is so slight that it is unable to decompose them. It must be remembered, however, that the sulphuretted sulphides and the hyposulphites may proceed from the action of the air upon the sulphur and the sulphocarbonates, the result of which would be to retain all these bodies in dissolution, and thus alter the character of the product. But here I may again remark that though these causes of impurity may be of some importance when a laboratory reagent is in question, they are by no means so in actual practice, as these foreign bodies then exist not only in very small quantities relatively to the entire mass, but being sulphurous products may actually contribute, proportionably with the principal product, to the definitive result in view—viz., the destruction of the *Phyllozera*.

Third Process.—This process, which Berzelius specially recommends for the preparation of sulphocarbonate of magnesia and the metallic sulphocarbonates applied in the manufacture of sulphocarbonate of potash, is capable of producing good results. It consists, as has been already stated, in operating by double decomposition, starting with the sulphocarbonates of baryta and lime.

These two sulphocarbonates may be easily prepared in the manner indicated by Berzelius. In the *Annales de Chimie et de Physique* (vol. xxxii., p. 84) he says: "Sulphocarbonate of baryta is not easily dissolved in water. Crystallized sulphide of barium combines very readily with sulphide of carbon, and the result is the production of a citron-coloured non-crystallized salt, which adheres to the inner sides of the glass, but may be easily detached. The supernatant solution is of an orange colour. The yellow salt likewise dissolves in water, also with an orange colour. Evaporated in a vacuum, it leaves small translucent crystals of a pale yellow colour."

All the aforegoing facts have recently been confirmed by M. P. Thenard, in a note inserted in the *Comptes Rendus* of the Academy of Sciences, and he has rendered them complete by the addition of further details with regard to the preparation of sulphocarbonate of baryta on a large scale. These additional details will doubtless be turned to good account by manufacturers, should circumstances ever require it.

With reference to calcic sulphocarbonate, Berzelius says it "gives a dissolution of a very dark red colour, which becomes still deeper when kept in a closed vessel." It is prepared as follows:—"Pure gypsum is decomposed, by means of coal dust, in a porcelain retort, and the resulting sulphide of calcium is mixed in a flask with some distilled water and sulphide of carbon. When the flask is full the mixture is digested until the whole of the sulphide of calcium is dissolved and there remains only the sulphide of carbon mixed with the coal dust which is found in excess after the reduction of the gypsum."

Instead of operating in a retort, the gypsum may also be reduced in an oven or in gas-retorts, in the manner indicated by Pelouze.

When the sulphocarbonates of baryta or lime are prepared, nothing is easier than to transform them into sulphocarbonate of potash.

All these processes, it will be readily perceived, are exceedingly simple; they also have the advantage of requiring only the employment of articles of low market value—sulphide of calcium and sulphide of barium. The preparation of this latter body has, it is well known, attained considerable importance as a manufacturing operation since its employment by MM. Dubrunfault and Leplay in the extraction of crystallizable sugar from molasses. The double decomposition processes, on the contrary, require washings and expensive manipulations, which would always cause their rejection whenever they happened to be in competition with direct processes. It must be added that, in all the processes here described, it is necessary first to prepare a sulphide, which is afterwards submitted to the action of sulphide of carbon. Now, sulphide of potash is more easily manufactured than the sulphides of barium and calcium, notwithstanding the perfection attained in the manufacture of these articles. I believe, therefore, I am correct in stating that the second process which has been examined in this paper is in every respect far preferable to the other two for the preparation of sulphocarbonate of potash in large quantities.

If the success of the experiments undertaken for the destruction of the *Phyllozera* should be confirmed, a product of some value in this respect, obtainable at a reasonable rate, will not be wanting. M. Dumas was, therefore, perfectly right in relying for assistance upon the labours of the manufacturing chemists, and in believing in their ultimate success. He has, however, in my opinion, greatly exaggerated the difficulties of the task they had set themselves, inasmuch as they were in possession of all the facts made known so many years previously by Berzelius, and this must have considerably assisted them in their work.

In the present paper I have confined my remarks almost exclusively to the labours of Berzelius. Those manufacturers who have turned their attention, within the last few years, to the subject of the production of sulphocarbonate of potash, have added scarcely any new facts to those which were already known. Having tried successively the first two processes indicated by the eminent chemist above referred to, they appear to be occupying themselves at the present time in endeavouring to discover the third.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

At some of the iron-works and foundries rather more work is being done than was the case last week, but in the majority of instances matters remain very quiet, with every appearance of continuing so throughout the first quarter of the year.

There is still a very good demand for all descriptions of brass-work for plumbers, gas and water purposes, as well as for special water-works requisites, such as hydrants, fire-plugs, and the like. The late exceedingly severe frost has had its natural result upon water and steam pipes, hundreds of which have been burst, and have had to be replaced since the frost disappeared. Many pumps have also been burst or deranged, so that in one way or other the founders and engineers have had a busy time of it in effecting the necessary repairs.

The decision of the Staffordshire ironmasters not to reduce their quotations for finished iron has been received with surprise here, inasmuch as there was, and is, a general feeling that until a reduction of at least £1 to 30s. per ton is declared, no revival of trade can be hoped for. North country pig iron is certainly a little weaker to buy, current figures for G M B being these: No. 1, foundry, 64s.; No. 2, foundry, 62s. 6d.; No. 3, 58s. 6d.; No. 4, 57s.; No. 4 forge, grey, 56s.; No. 5 forge, M, 55s.; No. 5 forge, white, 54s.; refined metal, 77s.; Kentledge, 62s.; and cinder, 44s. per ton for net cash.

The steam coal trade remains quiet, but prices are firm, and have no apparent tendency to become weaker. A fairly good shipping business is being transacted between several of the South Yorkshire pits and the Humber ports—Goole, Grimsby, and Hull. Engine fuel does not sell very readily, but it is pretty steady in price at present, and there are indications that it will not be further reduced for some time to come.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The principal quarterly meeting of the ironmasters of South Staffordshire and East Worcestershire was held in the town-hall, Birmingham, on Thursday last, and was well attended. Much disappointment was expressed when it became known that the makers of branded iron had determined not to lower the standard of quotations, the leading ironmasters contending that so long as the current rates for fuel are maintained, they could not afford to make any concession in prices, and remarked that the recent reduction in ironworkers wages, amounting to 4s. or 5s. per ton only, was needed to allow them any margin for profit; consequently business was very limited, notwithstanding there were many buyers present, and some few shippers expressed themselves determined to withhold all but the more urgent specifications until a reduction in prices is submitted to, the prevalent opinion being that the much needed reduction will be made next month, when it is anticipated all the old orders will have been worked off. Marked bars are quoted £10 10s. to £11 12s. 6d., the general standard being £11 per ton. Sheets (singles) £13 to £15, and other descriptions of merchant iron in the usual proportion.

In pig iron the maket showed considerable firmness, and in most cases an advance of from 1s. 6d. to 2s. 6d. per ton was established.

Cinder pig is still obtainable at £3 per ton, but £5 is the minimum quotation for native all-mine hot blast, and £6 for cold blast ditto.

The proposed reduction in wages in this department of the trade has been deferred for the present.

A valuable seam of ironstone has recently been struck at Aldridge near Walsall, and it is expected that blast-furnaces will be erected in that neighbourhood immediately.

Coal is nominally unchanged; the better qualities fully maintain their value, considerable orders having accumulated during the late frost. But inferior descriptions are again weaker, and it is anticipated that there will be a general fall in prices early next month at latest, as the new inquiries are already very limited. Engine slack is in abundant supply at low rates.

At Wednesbury the prospects of the tube trade are again complicated by a labour dispute. It appears that the masters are desirous of returning to the old ten hours system of work, in place of the nine hours now in operation there, and which, it would seem, is confined to the Wednesbury district. Notice has accordingly been given to large numbers of the operatives who, however, maintain a very defiant attitude, and at a meeting held on Thursday, expressed their determination to strike rather than submit to the proposed increase in the hours of labour.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

Taking the Lancashire coal trade all through, although there is still plenty of demand for all classes of coal, and supplies in many cases are still very deficient, there are signs that the extraordinary pressure, which has of late existed, is somewhat relaxing. In some of the outside districts supplies are slowly accumulating, but not to the extent, as yet, of at all affecting prices, although it is scarcely probable that, when proper railway deliveries can be resumed, the present high rates will be maintainable. At many of the collieries, especially the smaller concerns, coal has been put down on the pit banks, in consequence of the deficiency of means of locomotion; but as soon as the opportunity offers, this will be pushed upon the market; and as the milder weather is now easing the demand for house coal, supplies will be plentiful, and prices may be expected to be easier.

In the Manchester market, however, at present, everything is very stiff, from the causes for which, as I have previously pointed out, the railway companies are responsible; and supplies have been so difficult to obtain from the collieries that some works have been stopped for want of fuel, and the deliveries of house coal are very far in arrear. There is, however, except so far as dealers are concerned, no change in prices, which range, for delivery in Manchester, about as under:—Best coal, 18s. to 19s.; engine coal, 13s. to 14s.; and burgy, about 10s. 6d. per ton.

In the Wigan district matters remain without change, and the average pit prices are: 15s. to 16s. per ton for best coal, 13s. to 14s. for seconds, 10s. to 12s. for common coal, 8s. to 8s. 6d. for burgy, and about 6s. per ton for slack. In the St. Helen's district, although there is ample demand for coal, colliery proprietors are troubled with slack, of which there is a considerable accumulation, the dulness in the chemical trade preventing manufacturers, who are usually very large consumers of this description of fuel, taking their usual quantity, and prices are irregular.

For gas coal, although consumers are in a better position than they were, in consequence of some slight improvement in the railway traffic, there is still a very brisk inquiry; but, as colliery proprietors are not as a rule quoting prices, rates can scarcely be given, except that they are very firm at those which have been ruling of late, ranging from 14s. to 15s. per ton for good gas coal at the pit mouth.

The coke trade is brisk, and prices are steady.

In the iron trade matters still remain in an unsatisfactory state, as the quarterly meetings have not resulted in the reduction in prices which was anticipated, and consumers are still withholding their specifications, in anticipation that two or three weeks may see a decided fall in the market. In pig iron, Middlesborough makes are easier, and are quoted at very low rates. No. 1 can be bought as low as 72s. 9d.; No. 2, 68s. 9d.; and No. 3, 66s. 9d., delivered in Manchester during the next month. In manufactured iron, Staffordshire bars, delivered, are quoted at £9 10s., Middlesborough ditto at £9, and rails at about £7 12s. per ton.

The works in this district are generally complaining of slackness in trade, and are not working to their full production.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The most striking feature in the coal trade of the North of England is the very active demand that has sprung up for all kinds of gas coals. The recent stormy weather seems to have considerably deranged this trade, especially to the smaller ports, and the smaller gas companies are very urgent to have their orders speedily completed. There is now an abundance of ready sailing ships in the Tyne and adjacent coal ports, and coasting freights have fallen more than 1s. per ton; but none of the leading gas collieries, and few of the second-class ones, will undertake to load ships under a fortnight, and, in some instances, a three weeks turn.

The colliery wagon ways are now doing much better than they have for some time, and the shipments of gas coals at the Tyne dock are tolerably satisfactory. The household coal trade is very firm, and nearly all the household collieries are at full work. Prices for the best sorts of household coals are not less than 16s. per ton. The demand for steam coals is quiet, though the pits are working a little better than they were a fortnight since. The price of steam coal is without change. The market is quite open, and there are no signs of many contracts being entered upon at present for any class of coals.

The Cleveland iron trade has been a trifle better this week, possibly arising from the disturbed state of affairs in South Wales. Some of the rolling-mills which had been knocked off recommenced work again last week, and, though the improvement in the iron trade was not very striking, still there was an improvement.

A crisis has taken place in the chemical trade. It was stated last week that, on account of the continued depression of the trade, the men had agreed to submit to a reduction of wages, but that the masters were anxious to have the men to go back to 12-hour shifts, and to pay them 1s. a shift extra for the work done. The men objected to that, when the Newcastle Chemical Company, who employ 3000 men, intimated that, without some such agreement was come to, they would close the works on the 23rd inst. But from the fact that men belonging to some of the other factories on the Tyne have come to an agreement with their employers, and have returned to work, there is every prospect that the men at those works will fall in with the masters proposals, and that there will be no need to stop work. The prices of chemicals last week were low, and it has been found that the current rates involve a loss to the manufacturers, especially upon crystals of soda and soda ash.

There is not much change to note in the other trades of the North of England. Business keeps very quiet, and there is a large number of men out of work.

A debate in the Newcastle Town Council on the water question was adjourned last Wednesday for a month. There is less talk of the public bodies of the North taking up a great water scheme for the supply of the district from Ullswater. As the reservoirs belonging to the water-works of the district have got full, the zeal of the town councillors for new works has considerably abated.

INCREASE IN THE IMPORTATION OF PETROLEUM.—The declared value of petroleum imported into England last year was £1,002,541, against £983,948 in the preceding year.

THE GAS QUESTION AT HULL.—At a special meeting of the Hull Town Council on the 4th inst., it was unanimously resolved—"That a special committee, consisting of Messrs. Seaton, Witty, Laverack, Bannister, Spurr, Hodge, Ansell, Elam, and Larard, be appointed to consider the present supply of gas to the borough and its inhabitants, and to report thereon, and on the best means by which any and what improvement therein may be effected."

THE ALLEGED FRAUDS IN EUPION GAS SHARES.—At the Central Criminal Court, on Tuesday last, the grand jury found true bills against Messrs. Joseph Aspinall, William Whyte, Samuel Gurney Fry, George Parkyns Knocker, John Saunders Muir, and Charles Knocker, for misdemeanour, in connexion with the Eupion Fuel and Gas Company. The trial has been postponed until next sessions; but it is possible that it may yet be removed by a writ of *certiorari* to the Court of Queen's Bench.

QUALITY OF GAS AT SHEFFIELD.—At the Sheffield Town Council, on Wednesday last, the report of Mr. Wilkinson the gas examiner, for the month of December, 1874 was presented. It was as follows:—"I have the honour to report the results of 11 examinations of the gas supplied by the Sheffield United Gas-light Company, at the office in Waingate, during the month of December, 1874. The average illuminating power, when corrected, is 16·10 candles. The highest test, 17·35 candles; lowest, 15·34. Ammonia was present in small quantity at all times. Sulphuretted hydrogen gas was detected in large quantity on the 24th of December. I immediately informed the gas company of the presence of this impurity, and received two notes in reply, explaining the cause."

GAS EXPLOSION AT ASHBORNE.—On the 12th inst. an explosion of gas took place at the Green Man Hotel, in Ashborne, whereby that well-known hotel was considerably damaged. The explosion took place in the drawing-room, a spacious apartment over the carriage entrance to the hotel. The gas had escaped through a sliding chandelier, and the man who was sent to find out the escape inconsiderately took a light, and thus fired the liberated gas. A large window looking into the yard was blown out bodily. The wall opposite was also torn out, and carried to the extent of the passage wall adjoining. No lives were lost but the man, who went into the room was considerably hurt; and the chambermaid, in rushing out of an adjoining room, met the full force of the explosion, and was burnt about the face. Miss Wallis, the proprietress's daughter, had the moment before left the room, where she had been playing on the piano. Most of the furniture in the house was moved, and about a score panes of glass to the front of the house, in different rooms, were smashed.

ENTERTAINMENT AT THE READING GAS-WORKS.—The annual tea given to the *employés* of the Reading Gas Company was held on Wednesday, the 6th inst. This gathering, always looked forward to with interest by those concerned, was held in a store-room at the gas-works, which had been neatly decorated for the occasion by Mrs. Smith, wife of one of the foremen, assisted by others. Mr. E. Baker, the engineer and manager of the works, and Mrs. Baker used their best exertions to agreeably entertain the workmen and their wives, to the number of 130. Mr. R. Bradley, the secretary, was present, and received a warm welcome from the *employés;* and among the visitors were Mr. Eldridge (manager of the Richmond Gas-Works), Mrs. R. Bradley, the Misses Buckland, Miss Compigne (whose efforts on the pianoforte were much appreciated), and several other ladies. Mr. E. Hunt, of Minster Street, exhibited some interesting dissolving views of the Holy Land, and graphically described them. Mr. Holloway, the missionary among the men, deserves the credit of having got up the entertainment.

COAL SUPPLY OF LONDON.—At the meeting of the Metropolitan Board of Works on Friday last, Mr. Leslie called attention to the supply of fuel to the metropolis, and moved for a special committee to investigate as to the monopoly in all its branches of colliery-owners, railway and other carriers, and the operators of the Coal Exchange. In bringing forward the motion, he said he would read a few extracts from documents which had come into his possession. The first one was a return of the quantity of coals brought into the port of London. It appeared from this document that for the year 1874 about 442,000 tons less coal was brought into London than in the preceding year; and there was another remarkable fact, that the whole of the deficit in the supply was by railways. There was an excess in the quantity brought by ship, but a very considerable decrease in that brought by railway. It appeared, from the document which he had referred to, that a large proportion of the supply came by ship, and that of that coming by rail, the Midland brought about one-third of the whole amount. He had a number of other facts in hand, but he wished to keep them for the committee which he proposed. The quantity of coal consumed by the board in 1870 was 10,741 tons, whereas for 1874 they used 16,000 tons, the difference being 52 per cent. more, but in respect of money they paid 158 per cent. more. The motion was seconded by Mr. Legg. Some of the members present laughed at the proposal, but Alderman Sydney said he did not think it was a matter to be laughed at; on the contrary, he looked upon it as a most important subject, as there was a wide field for profit, and the difference in the supply of coal now varied more than on any former period, as he knew by the contracts made in the City of London for the supply of the asylums and prisons. It was marvellous, however, that where he lived he had coals delivered at his residence at 19s. per ton, whereas in the City they paid 26s. per ton for the same description. He considered that the board, as a public body, were largely interested in the supply of coal, as they derived a large sum from the coal duties, and on behalf of the poor, he considered that this was a subject that demanded inquiry. On a division, the motion was negatived by 16 to 11.

LEEDS WELL WATER.—The further hearing of the application by the town-clerk (adjourned from the 15th ult.) for the closing of a well near Chapeltown was resumed at the police court, before Mr. Bruce, on the 8th inst. It will be remembered that the matter was adjourned on the suggestion of the magistrate, so that notice of the application might be given by advertisement in the Leeds newspapers. The town-clerk now stated that the suggestion had been carried out, but no one appeared to oppose the application. Under the Sanitary Act, the owners of the property occupied by persons who probably had the use of this well were bound, on being required, to pay for a supply of water not exceeding two days a week. They had been required to do so, so that the occupiers would not be put to any inconvenience. An order was then made to close the well. The town-clerk made a further application in the case of a well at Whitecote, near Bramley, the application in this case having also been adjourned until an analysis of the water was made by Mr. Scattergood. The town-clerk stated that Mr. Scattergood declined to analyze the water, and they went to Mr. Reynolds (Messrs. Harvey and Reynolds, chemists), who reported that it contained more matter of animal and vegetable origin than was usually found in the inferior varieties of water supplied to towns. It could not, therefore, be classed as of good quality. Mr. Fairley, borough analyst, who had also examined a sample of the water, stated that it contained ammonia and nitrate in larger quantities than occurred in good drinking water. In his opinion it was unfit for drinking purposes, but it ought not to be put aside where no other water could be obtained. Bad water was better than none. Mr. Bruce said he supposed Mr. Fairley meant that it would be imprudent, if they could get other water, to drink this. Mr. Newhouse, in reply to a question as to whether the town's water was laid on there, said that the Sanitary Committee applied to the Water-Works Committee in November, to carry the main from Mrs. Farrer's property to Whitecote, a distance of 200 yards, and offered to pay 10 per cent. on the outlay for three years, but it had not yet been done. Mr. Bruce said he must be sure that these people had some water. Mr. Fairley had said very truly that the bad water was better than none. Mr. Newhouse stated that the town's water would be laid on within two months. Mr. Bruce: Do you think, Mr. Fairley, that any danger to health is likely to arise by a delay of two months? Mr. Fairley: So far as I know, I don't think it would give rise to any serious danger at this time of the year, unless infectious diseases were prevalent in the neighbourhood. The Town-Clerk: When I am prepared to tell you that the water is laid on, I will ask you for an order. Mr. Bruce said there would be no doubt in his mind then that it would be proper to close the well. Some dissatisfaction had been expressed that both these wells were not closed when the application was made in the first instance. He did not think it necessary to say by whom this was expressed (not by the town-clerk or by the corporation). But if people would only reflect, they would see that the closing of a well was not a matter which was to be hastily decided upon. If there was no other water, it was decidedly better to go on drinking that than to take it off at once. If the well at Bramley had been ordered to be closed up on the first occasion, the people would have been placed in the position of having no water whatever to drink unless they fetched it from a distance. With regard to the well at Chapeltown, he believed he rather exceeded his authority in requiring a notice to be given, but yet he was of opinion that on the whole it was better to give that notice. A justice of the peace had to exercise a reasonable expedition, but he could not at once close up a well in a town as soon as he was called to do so.

Register of New Patents.

1824.—BELL, J., Wishaw, Lanark, "*Improvements in distilling coal shale for the production of oil and gas, and in the apparatus employed therein.*" Patent dated May 23, 1874.

This invention, which relates to improvements in distilling coal shale and other substances for the production of oil and gas, and in the apparatus employed therefor, consists in the employment of a tubular retort fixed in a horizontal position or at a suitable angle, and containing a shaft so constructed that the shaft may be made to revolve in bearings at each end of the retort, the said shaft carrying portions of a screw thread and also flat blades, each portion of the screw thread consisting of one complete turn of the screw, and the portions of screw thread and the flat blades alternating along the shaft. The thread of the screw and the edge of the blades are to be formed so as nearly to touch the inner surface of the retort, but yet to revolve easily therein. The object of the portions of screw is to move the charge forward from one end of the retort to the other, and that of the blades is to turn it over repeatedly in its progress onward. The screw blades are perforated with holes, to allow the gases generated to travel along the retort to the eduction-pipe. The shaft is caused to revolve in the cylinder by a revolving tangent screw, or other gearing driven by steam or other power.

The material to be distilled is either roughly ground or reduced to a finer grain as the material may require, and it is charged into the retort at one end from a vertical hopper having a revolving feed, the size of the feed being so proportioned to the dimensions of the retort and pitch of the screw, and the rapidity of the revolution of the feed being so proportioned to that of the screw shaft within the retort, that the retort shall not at any time be choked by too great a charge of material, but room left for the free evolution of the gases. The retort ought not at any time to contain much more than half the quantity of charge which might be forced into it. The revolution of the shaft carries the charge forward, and turns it over repeatedly in its progress.

An eduction-pipe for the gases is provided at the other end, and the condensable and uncondensable gases are collected and treated according as illuminating gas or oil is wanted, in the usual way.

The spent shale on arriving at the end of the retort is made to fall down a vertical pipe fitted on to the neck or end of the retort, and thence into a horizontal pipe or passage, along which the spent shale is drawn or pushed by a revolving screw, the said horizontal pipe or passage being sealed at the end towards which the spent shale travels, and at which it is thrown out into bogies or waggons by being made to rise in a curve above the level of the rest of the pipe, so that the spent shale itself dry seals the pipe, or the pipe may be water-sealed in the ordinary way.

Retorts of the kind hereinbefore described may be placed together in sets of two, three, or more in a bench or oven in the ordinary manner.

When it is desired to make illuminating gas, retorts of the kind hereinbefore described are used in the first stage, to drive off the gases from the material employed, and these gases are then by an exhaust drawn from the aforesaid retorts, and forced through pipes into the usual gas-retorts, generally made of clay, where a very high degree of temperature converts the whole of the gases into permanent illuminating gas, which is led away into a gasometer for use. These gas-retorts are placed in such a position relatively to the other retorts first above-mentioned as will permit the gas from the gas-retorts, when it is not desired to collect it for illuminating purposes, to be led into the oven or bench in which the said other retorts are set, and be burned there in order to heat the said other retorts.

When ground coal is used in the retorts for making illuminating gas, the charge, after passing through the first set of retorts, may be converted by mixing it with tar, or other suitable substance, into what is commonly known as "patent fuel."

1868.—Oram, W., Salford, "*Improvements applicable to machinery for pumping or forcing water, air, or other fluids.*" Provisional protection only obtained. Dated May 28, 1874.

This invention refers to those cases in which fluids are pumped or forced into air vessels, or are in other ways brought under pressure for hoisting, pressing, exerting motive power, or other such uses, and consists in a method of economizing the motive power used for such pumping or forcing. For this purpose a valve, or another part loaded to the required working pressure, is caused to open (when such pressure has been sufficiently established for use) a valve, through which the motive power may then transfer the fluid. Suppose it is desired to accumulate water in an air vessel under pressure, any ordinary pump forcing water into the said vessel may be employed; but when an excess of pressure has been attained, then a safety-valve is opened, and, so far, the arrangement would be that in common use, excepting that, for the purpose of this invention, the part representing the valve may be a simple plug, without any provision for the escape of fluid. To the lever of the safety-valve, as it is called, another valve is connected, which it opens by its aforesaid motion; and then the motive power, instead of pumping against pressure, will simply pass the fluid through the said opening into the reservoir for the pumps, or to any other desired situation.

1896.—Kirkman, J., Chorley, "*Improvements in packing for the stuffing-boxes of steam-engines and pumps, and for other joints requiring to be made steam, air, or water tight.*" Patent dated May 30, 1874.

This invention relates to improved packing, which consists of yarn or strands of fibrous material saturated, impregnated, or covered with a solution of pure india-rubber or india-rubber compound, either with or without talc, soapstone, or other lubricant.

1916.—Johnson, J. H., Lincoln's Inn Fields, London, "*Improvements in apparatus for filtering or separating liquids from solid matters contained therein.*" A communication. Patent dated June 2, 1874.

This invention relates to centrifugal apparatus to be employed for filtering drainage water and sewage, and generally for separating or straining liquids from solid matters with which they are mixed, and consists in the employment of a cylinder, the periphery of which is composed of perforated metal or other suitable reticulated or filtering material, such cylinder being mounted fast on a rotatory hollow shaft or axis, which is open at one end and closed at the opposite end, and is carried in bearings or stuffing-boxes, provided in the ends of an outer trough or receptacle, into which the liquids to be filtered or strained are introduced. The rotatory shaft or axis is placed below the upper edge or level of the liquids in the trough or receptacle, and has formed in it in that portion of its length which is situate between the two ends of the cylinder a suitable number of slots or apertures, so that the liquid will be caused to traverse the meshes, reticulations, or interstices of the cylinder, and enter its interior, and thence pass through the slots or apertures into the interior of the hollow shaft or axis, whence it may be conducted into any required place; the solid matters in suspension are retained in the trough or receptacle, the bottom of which is made of a suitable form to facilitate their removal at intervals, the centrifugal forces tending to drive such solid matters from the circumference of the cylinder, and so prevent them from adhering to the filtering surface and obstructing the passage of the liquid.

1929.—Schanzer, L. I. L., Odessa, "*A new or improved instrument or apparatus for drilling and tapping or screwing mains under pressure, and attaching pipes, cocks, or connexions thereto.*" Patent dated June 3, 1874.

This invention is designed to enable holes to be readily drilled and tapped or screwed in mains containing water or fluid under pressure, and pipes, cocks, or connexions to be screwed into such tapped holes without its being necessary for these purposes to cut off or arrest the supply or flow of water or fluid in the portion of main to be operated upon. For these purposes a drill and tap or screw-thread cutter is employed in conjunction with a vessel or chamber provided with doors and valves, and arranged to be temporarily fitted and attached to the main for preventing any considerable escape and consequent waste of water or fluid during the operations. The vessel or chamber may be cylindrical in cross section, with upper and lower covers, the upper cover being made with a removeable portion, and the lower cover provided with sliding portions or valves and with suitable packing for temporarily fitting the vessel to the main, whereto it is secured and held by cross-bars, screws, and nuts.

In order to enable the drilling and tapping of the hole in the main to be effected at a single operation, a tool is used which forms a combined drill and tap, the forward or lower end of the tool being shaped as a drill, and having behind it a tap or screw-cutting arrangement. This combined drill and tap is attached to a spindle, which passes vertically through the vessel, and is actuated by a ratchet and lever. The spindle in this arrangement passes and fits accurately between a couple of semi-pipes or nipples having perfectly smooth interiors, and formed on their exteriors with a screw-thread fitting into a correspondingly tapped nut. A set screw carried by a frame on the top cover of the vessel, and bearing against the upper end of the spindle, feeds the drill to its work. The vessel is provided with a cock for the withdrawal from it of the water or fluid as required.

1944.—Howes, W. H., Curtain Road, London, "*Improvements in means or apparatus employed in the manufacture of gas for lighting and heating purposes, part of which improvements is also applicable to gas-meters.*" Patent dated June 4, 1874.

The invention relates, firstly, to a novel arrangement and combination of apparatus to be employed in the manufacture of gas by forcing atmospheric air through or in contact with hydrocarbon fluids. For this purpose an apparatus is employed having some of the general features of a wet gas-meter, to the drum of which rotary motion is communicated by any suitable means, to force the air through the carburetting chamber. The drum is formed with a cylindrical space in the centre, in which space is fixed the axis of motion. The inlets to the chambers are formed in the inner periphery of the drum, and each chamber has two outlets, one being on one side of the drum in advance of the other, which is on the other side thereof. The chambers are formed by division-plates soldered securely to the inner and outer periphery of the drum, and meeting in the centre at the inlet orifice, whence they diverge gradually towards the sides until they come, the one to the first outlet orifice and the other to the second outlet orifice of each chamber, such outlet orifices on one side being intermediate of the outlet orifices on the other side.

The drum is mounted in suitable bearings carried by a case, in which the drum is enclosed, and air is supplied to the interior by means of an inlet-pipe communicating with a chamber, from which another pipe passes to the space in the centre of the drum, and a little above the water-level therein, in a similar manner to that employed in ordinary wet gas-meters. The inlet orifices are arranged in relation to the outlet orifices, so that at the moment when an inlet orifice is closed, the first outlet orifice of the same chamber commences to open or rise above the level of water in the case. The case is provided with an outlet-pipe, which conducts the air passed through the drum into the carburetting apparatus, such pipe being passed into the chamber at the lower part thereof and rising to the upper part.

The carburetting apparatus consists of a chamber of any convenient form, which is supplied with hydrocarbon liquid. In this liquid is placed a float, and on the top of the float is fixed a chamber provided with horizontal circuitous channels or passages filled with horsehair or other material capable of taking up the hydrocarbon liquid and giving it off to the air passing in contact therewith. The chamber carried by the float has fixed thereto a tube closed at the upper end, and rising and falling within another tube also closed at its upper end, and fixed to the upper part of the chamber, in which the hydrocarbon fluid is placed. The inlet-pipe is placed within the first-mentioned tube, and the float is guided by suitable guides; thus, whilst air from the forcing-drum is compelled to pass through the circuitous channel in the chamber carried by the float, the float is enabled freely to rise and fall in the liquid chamber. The circuitous passage in the carburetting chamber is formed by division-plates soldered therein in such manner that each alternate plate extends to one side and comes a little short of the other side of such chamber. When the lighter parts of the hydrocarbon fluid have been given off, and the float has fallen in the chamber, a space will be left in the upper part of the chamber, thereby enabling a certain quantity of gas to remain a short time in such space, by which means the proper mixture of the component parts is secured. The gas thus formed is conveyed away from the generating apparatus to the burners in the ordinary manner. By these means the illuminating power of the gas is always maintained at or about the same point.

The second part of the invention consists in the employment of a drum, constructed as before described, for measuring the gas in its passage through a wet gas-meter, in which case, instead of giving rotary motion to the drum, as before described, the pressure of gas is caused to give rotary motion to such drum, as is well understood, and it is preferred to form in the interior of the drum a float, and to mount the drum in arms fixed on centres of motion, to enable it to rise and fall with the varying level of the water in the meter.

1957.—Hazlehurst, G. S., Runcorn, "*Improvements in apparatus for pumping liquids, particularly applicable for pumping acids.*" Patent dated June 5, 1874.

This invention relates to pumping liquids by the peculiar use of a diaphragm or collapsable bag or pipe of any suitable form, which may be of india-rubber or other flexible material, and which is so arranged that it will collapse and expand according to the excess of pressure inside or outside the diaphragm; and this invention is particularly applicable for pumping acids, such as muriatic and other acids, inasmuch as india-rubber can be used without detriment to retain the acid, and this material is known to be specially adapted for that purpose.

1958.—Stacey, J. T., and Lace, A., Newbury, "*Improvements in the construction and arrangement of apparatus for carburizing atmospheric air to be employed for illuminating and other purposes.*" Provisional protection only obtained. Dated June 5, 1874.

The main portions of the apparatus consist of a "receiver" and "generator." Air is forced from the receiver into the generator, which latter consists of a series of cells filled with sponge or other absorbent substance, the same being saturated with oil or hydrocarbon fluid capable of being volatilized at a low temperature. The air in its passage over or through the absorbent substance becomes saturated therewith, and can be applied to any suitable purpose. The apparatus is provided with all necessary pipes, cocks, and other appliances.

1959.—Hughan, W. H., Southport, "*Improvements in the treatment of sewage, night-soil, and towns refuse and like matters, to utilize them as manure, and in the production of an artificial fuel to be employed in the said treatment, and for other purposes.*" Provisional protection only obtained. Dated June 5, 1874.

According to these improvements it is proposed to throw into closets, sewers, or sewage tanks, a preserving powder to prevent decomposition, which the inventor calls the sanitary powder; then he adds a second powder which causes the manurial products to be precipitated, which he calls the precipitating powder; he then drains off the water by downward filtration, and the residuum is mixed with hot superphosphate, manufactured in the usual manner, and in about 24 hours becomes a dry sewage phosphate manure or night-soil phosphates.

The sanitary powder is formed of Portland cement or like materials, sulphates of soda, magnesia, and potash, mixed in oil (mineral oil preferred) until of a consistency of mortar, and decomposed by sulphuric acid, well boiled, and when dry is ready for use. A powder for the same purpose is also made from material such as kainit and sea-weed boiled with clay (china preferred) and soda waste, all reduced to pulp until saponified, the mass being then treated with sulphuric acid.

The precipitating power is formed of Portland cement or like material with a little fluorspar mixed, soaked or set in oil, mineral, or the distilled oil from the carbonization of coal ashes, until indurated, and then powered. For use in dry closets a powder is formed from the carbonization of coal ashes in gas revolving retorts, the gas and oil being collected. The cinders are separated and the black ash portion is the powder for closets. The contents of the closets and powder are mixed with animal cement powder—viz., farmyard manure (or rich street sweepings or sea-weed) triturated in a mill with diluted sulphuric acid (or plaster of Paris), and further incorporated with clay and quartz or sea-weed until capable of being moulded into bricks, which are dried, calcined, closed from, and then burnt in the open air as cement until all the charring has disappeared; the result of the mixture is a rich nitrate manure. The fuel is formed by mixing peat, pulp, sand, and clay with hot Yorkshire or other similar lime, and slaking in closed vessels. The ashes from this fuel it is said form a good portland cement.

1973.—Matthews, H., Bristol, "*Improvements in apparatus for preventing the return or back flow of gas, water, and other fluids, in sewers, drains, and other similar situations.*" Patent dated June 6, 1874.

This invention is designed to afford a simple and efficient means of preventing the return or back flow of gas, water, and other fluids in sewers, drains, and other similar situations. For this purpose to the outlet is adapted an inverted L-shaped valve, working at its angle on pivots, or upon a shaft or spindle car-

ried by bearings or supports, so arranged as to allow the face of the valve to rest against a suitable seat surrounding the outlet orifice of the sewer or drain, against which seat the closing face of the valve will be retained by the weight of its horizontal part.

1978.—WEST, J., Maidstone, "*Improvements in apparatus used in the manufacture of gas.*" Patent dated June 8, 1874.

This invention relates to improvements upon apparatus, for which letters patent, No. 1255, dated April 4, 1873, and No. 3225, dated Oct. 4, 1873, were granted to the present patentee, and consists in making the charger much the same in its general form as that described in the specifications of the patents referred to; but by the arrangement now patented its internal capacity is increased, and much of the gearing is dispensed with.

In the improved form of charger the bottom is constructed with a number of inverted V-pieces placed transversely, with spaces or openings left between each of them. Beneath the bottom of the charger, but close to it, is made to slide a plate with openings or ports in it, corresponding to the size of the openings in the bottom. When in one position this plate closes the openings in the bottom of the charger, but on being drawn out a suitable distance, the openings in the bottom of the charger and that in the plate coincide, and thus allow the material with which the charger is supplied to fall through into the retort. The movement of this plate is produced by a partial turn of the driving-rod acting through bevelled gearing and a crank upon a short arm attached to the plate, and by this means is made to slide backwards and forwards, thus opening or closing the outlet ports of the charger. The same partial turn of the driving-rod which passes through the body of the charger also operates upon the rake, hoe, or disc, through the intervention of a crank and short arm or connecting piece, and raises or depresses the rake at pleasure, the rake-head being made to slide up and down in suitable guides. The plough is also by preference attached to the bottom of the charger instead of being fixed to the rake-head.

Another improvement consists in attaching to the trolley or travelling carriage whereon the charger is placed for filling an upright shaft fitted at the bottom with a bevelled pinion which gears into a bevelled wheel fixed to one of the wheels upon which the carriage rolls. By turning a wheel or winch handle fixed to the top of the shaft, the carriage may be propelled along the rail upon which it runs with the greatest ease.

1992.—WALKER, W. T., Highgate, "*Improvements in the method of working gas-purifiers.*" Patent dated June 8, 1874.

This invention relates to an improved arrangement and method of working purifiers for purifying coal gas from carbonic acid, sulphuretted hydrogen, sulphur compounds, bisulphide of carbon, and other impurities.

To carry out the invention, a series of eight purifiers are, by preference, used, although this principle of working may be applied, or partially applied, to a lesser number—viz., to seven, six, five, or four purifiers, especially if the purifiers are made of large capacity for the work they have to perform, so as to enable them to continue working a long time without being changed.

One of the chief objects of this invention is to have the facility of completely reversing the direction of the flow of gas during the process of purification. This facility in some processes of purification is of great importance. For instance, by way of example, what is called "foul lime" in gas-works, or sulphide of calcium, is known to be one of the most effective agents for purifying gas from sulphur compounds other than sulphuretted hydrogen; but the odours given off by it are so offensive that it cannot be used in towns or even in their immediate vicinity. This renders another system of purifiers necessary to meet such cases, both for this purpose, and also for giving additional facilities in the working of the purifiers for the application of chemical processes which require the changing or the bringing back of the flow of gas in the direction or to the point from whence it commenced its flow.

This improved system or arrangement of purifiers consists in furnishing each purifier with a double inlet and two outlets; in placing two centre-valves, one on either side of each purifier, and attaching to each centre-valve a gas-valve, to prevent foul gas finding a passage from the inlet to the outlet, and to obtain the means of reversing the flow of gas as described, and of working the purifiers in the way found desirable for using the different chemical processes referred to.

Sometimes a return-main is used, placed at the lower part, and connected to the inlet-main on the left-hand side, and by this main the gas is returned from the left-hand side to the right-hand side, which gives the means of passing the gas through one or all of the purifiers in a similar manner to that hereinbefore described, and brings the outlet to the opposite end to the inlet end.

2034.—CLIFF, W. D., Wortley, near Leeds, "*Improvements in machinery for making clay retorts and other similar heavy articles made from clay.*" Patent dated June 11, 1874.

Hitherto it has been found impracticable to employ machinery in the manufacture of clay retorts and other similar heavy articles made of clay, on account of their great weight; but by the aid of the present invention they may be manufactured with comparative ease.

The arrangement of machinery proposed is vertical. At the upper part, carried on a suitable frame or standard, is a steam cylinder, to the piston-rod of which is fixed another piston, which acts in combination with the clay cylinder fixed below the steam cylinder. To the lower end of the clay cylinder is fixed the die or mould, the form of which is varied according to the form and dimensions of the retort or other article required. As the retort issues from the die or mould, it is received on to a loose board carried by a carriage provided with wheels, so that when the retort is completely formed the carriage with it may be run on a road or platform to any desired place. When the retort commences to issue from the die or mould, this carriage is supported by a table connected to the upper ends of slide-rods, which work through and are guided by suitable guides. These slide-rods are also connected together at their lower ends by a cross beam or bar, to the centre of which is attached a chain, which passes up over a suitable pulley to a balance-weight. Additional or compensating weights, supported at intervals on suitable brackets, are caught up by the first-mentioned weight as it ascends, and as the increasing weight of the retort in its descent requires them. These weights can be varied at pleasure according to the weight of the article being made. These additional or compensating weights are guided by suitable guide-rods. A brake wheel is fixed on the same shaft as that of the before-mentioned pulley, to hold the machine in its position when the retort or other article is fully formed, and to regulate the ascent of the table up to the die or mould. The brake wheel has acting in connexion with it a friction strap, which is connected to a lever operated preferably by a screw, and to this lever is pin-jointed a catch lever, which is employed to press down the table when the article is completely formed, so as to relieve the carriage and thus allow of its being moved away; or, if desired, another simple lever may be employed for this purpose.

2049.—LACK, P. J., Westmoreland Place, London, "*Improvements in valves for regulating the supply of gas, and in other fittings connected with gas-burners.*" Provisional protection only obtained. Dated June 12, 1874.

This invention has for its object the construction of fittings to be applied to and used in connexion with gas-burners, to render the same more economical with regard to the consumption of gases, and more generally efficient and convenient. The invention relates, first, to a valve for regulating the quantity of gas admitted to the burner. Another part of the invention relates to a novel contrivance for securing the glass globes or chimneys upon the galleries of the burners, and another part relates to the means for supporting a shield or disc for arresting or confining the smoke of the burner.

Share List,
OF
Metropolitan Gas and Water Companies.

(*Corrected by Mr.* F. N. GOLDING, *Sun Court, Cornhill, from the latest Stock Exchange Quotations.*)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	14 — 16
5000	20	Bahia (Limited)	20 0 0	3 0 0	10 — 11
1000	20	Do., preference	20 0 0	10 0 0	25 — 27
1000	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
1500	20	Do., perpetual preference	20 0 0	7 10 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	6 15 0	6¼ — 6⅝
10000	5	Do., fourth issue	4 0 0	6 15 0	⅞ — 1
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	34 — 35
7500	20	Cagliari (Limited)	20 0 0	7 0 0	14 — 16
180000	10	*Chartered* A ordinary	10 0 0	10 0 0	17½ — 18½
25000	10	Do. A, 5 per cent. preference	10 0 0	5 0 0	16½ — 17½
20000	10	Do. A, 5 per cent. do., 2nd issue	10 0 0	5 0 0	17 — 18
30000	10	Do. A, 5 per cent. do., 3rd issue	10 0 0	5 0 0	15⅝ — 15¾
10000	10	Do. B, 4 per cent. maximum	10 0 0	4 0 0	7¾ — 8¼
20000	10	Do. C, 10 per cent. preference	10 0 0	10 0 0	21 — 23
12000	25	Do. D, 10 per cent. preference	25 0 0	10 0 0	52 — 54
4488750	Sk.	*Commercial*	100 0 0	10 0 0	179 — 182
20000	20	Continental Union	20 0 0	8 0 0	20 — 21
20000	20	Do., new	12 10 0	8 0 0	par—¼ pm.
10000	20	Do., preference (Germy.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	25 — 27
5000	10	*Crystal Palace District*	10 0 0	10 0 0	17½ — 18
5000	10	Do., preference	10 0 0	6 0 0	12 — 12½
10000	10	Do., ordinary	10 0 0	7 0 0	12½ — 13
2500	10	Do., converted	2 0 0	10 0 0	1½ — 2 pm.
2500	10	Do., converted	2 0 0	7 0 0	1 —1½ pm.
23496	10	European (Limited)	10 0 0	10 0 0	14 — 15
12000	10	Do., new shares	7 10 0	10 0 0	2⅞ — 3¼
	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	10 0 0	1¾—2¼ pm.
4054	10	Foreign and Colonial (Limited)	10 0 0	..	9 — 10
5300	10	Hong Kong (Limited)	10 0 0	10 0 0	14 — 15
1560000	100	*Imperial*	100 0 0	10 0 0	181 —184
78000	12½	Do., new shares	12 10 0	7 0 0	16¾— 17¼
1800	100	Do., bonds	£100	10 0 0	197 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Frankfort-on-Maine, Haarlem, Stolberg, and Vienna.)	43 15 0	9 2 6	58 — 60
3000	40	*Independent*	40 0 0	10 0 0	69 — 71
3000	10	Do.	10 0 0	5 0 0	9 — 9¼
3000	20	Do.	20 0 0	7 10 0	27 — 29
4500	10	Do., D	3 0 0	10 0 0	3¾— 4
378350	Sk.	*London*	100 0 0	10 0 0	179 —182
150000	Sk.	Do., 1st preference	100 0 0	6 0 0	120 —125
14450	Sk.	Do., 2nd preference	100 0 0	6 0 0	
4250	Sk.	Do., 3rd preference	100 0 0	6 0 0	
7622	25	Do., A shares	12 10 0	6 0 0	
268050	All	Do., Debenture stock	100 0 0	5*l.* & 6*l.*	
15000	5	Malta and Mediterranean (Limited)	5 0 0	3 0 0	2 — 2½
6000	5	Do., preference	5 0 0	7 0 0	5 — 5⅝
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2 — 2⅛
25000	20	Monte Video (Limited)	20 0 0	..	22½ — 23½
8000	10	Nictheroy, Brazil (Limited)	10 0 0	..	
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	7¼ — 7¾
30000	5	Do., new shares	2 10 0	9 0 0	1—1½ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2½
17500	10	Pará (Limited)	10 0 0	7 0 0	5¾ — 6¼
27000	20	*Phœnix*	20 0 0	10 0 0	36½ — 37½
560000	100	Do., new	55 0 0	7 10 0	74 — 76
144000	Sk.	Do., capitalized	100 0 0	5 0 0	92 — 94
5000	20	*Ratcliff*	20 0 0	10 0 0	34 — 36
36000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	31 — 33
7359	5	Singapore (Limited)	5 0 0	7 10 0	4¼ — 5
2000	5	Do., preference	5 0 0	7 10 0	5½ — 6
1500	32½	Shanghai	32 10 0	12 0 0	30 — 32
4000	50	*South Metropolitan*	50 0 0	10 0 0	90 — 92
4000	12½	Do.	12 10 0	10 0 0	21 — 23
20000	12½	Do., new shares	5 0 0	10 0 0	6¼— 6¾ pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	17 — 18
10000	10	Do., new	8 0 0	10 0 0	6—7 pm.
9000	4	United General (Limerick)	4 0 0	2 10 0	2 — 2¼
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	14 — 15
1500	10	Do.	10 0 0	7 10 0	11 — 12
2957	10	Do.	10 0 0	7 0 0	
993	10	Do.	3 0 0	7 0 0	
16000	5	*West Ham*	5 0 0	10 0 0	7¾— 8
10000	5	Do., new shares	2 10 0	10 0 0	3 — 4
		WATER COMPANIES.			
12000	100	Chelsea	100 0 0	6 0 0	129 —131
1800000	100	East London	100 0 0	6 0 0	129 —131
8000	50	Grand Junction	50 0 0	7 0 0	80 — 82
5840	25	Do., ¼ shares	25 0 0	7 0 0	40 — 41
2160	25	Do., new do.; maximum dividend, 7½ per cent.	25 0 0	7 0 0	31 — 33
4396	100	Kent	100 0 0	6 10 0	140 —143
5339	100	Lambeth	100 0 0	6 5 0	132 —135
1161	100	Do.	20 0 0	6 5 0	
442	100	New River	100 0 0	8 0 0	170 —180
4475	100	Do.	30 0 0	8 0 0	50 — 55
400000	100	Do., debenture stock, 4 per cent.	100 0 0	4 0 0	97 — 99
3036	100	Southwark and Vauxhall	100 0 0	5 5 0	108 —110
1296	100	Do., preference stock	100 0 0	5 0 0	103 —105
	100	Do., D shares	100 0 0	5 5 0	107 —109
		Do.	..	4 10 0	
	100	Do., new ordinary	..	4 10 0	
1600	100	Do., new ordinary, No. 1	40 0 0	4 10 0	
12172	61	West Middlesex	61 0 0	£6 per sh.	132 —134

APPLICATIONS FOR LETTERS PATENT.

71.—Abel, C. D., Southampton Buildings, London, "Improvements in motor-engines worked by gas or combustible vapour and air." A communication. Jan. 8, 1875.

101.—Fyfe, D. A., and Bowers, W. H., Manchester, "Improvements in the method of and in apparatus for producing gas or gases for heating and for illuminating purposes." Jan. 12, 1875.

107.—Weatherdon, B. F., Chancery Lane, London, "An improved disinfecting fluid." A communication. Jan. 12, 1875.

108.—Higginson, A., Liverpool, "Improvements in motive-power engines, and in pumps." Jan. 12, 1875.

112.—Sellars, J. C., Birkenhead, "Improvements in cement." Jan. 12, 1875.

135.—Scott, H. Y. D., Ealing, Middlesex, "Improvements in the purification of coal gas." Jan. 13, 1875.

141.—Cave, J. O'C., Weston-super-Mare, "Improvements in the construction of apparatus capable of being employed as an automatic governor or steam-regulator, steam-gauge, safety-valve, and high-steam alarm; and also for regulating the flow or pressure of air, gas, water, and other fluids." Jan. 14, 1875.

150.—Rydill, G., Chancery Lane, London, "Improvements in machinery and apparatus in the construction and working of vessels, tanks, reservoirs, and areas; for the treatment of sewage and dye waters, also treating, purifying, and preventing the pollution of rivers and streams, so that towns may be supplied with water for domestic and manufacturing purposes; and for improvements in machinery, apparatus, and materials used for supplying water-closets with water, and for other purposes." Jan. 14, 1875.

153.—Newton, H. E., Chancery Lane, London, "Improvements applicable to burners for lighting purposes." A communication. Jan. 14, 1875.

156.—Johnson, S. H., Stratford, Essex, "Improvements in cocks or valves." Jan. 14, 1875.

GRANTS OF PROVISIONAL PROTECTION.

4363.—Gill, D., Weston-super-Mare, "An improved method for relieving private drains of sewer or drain gas." Dec. 18, 1874.

4431.—Wanklyn, J. A., Charlotte Street, London, "Improvements in the purification of water." Dec. 23, 1874.

4435.—Powell, C. E., Binfield, Berks, "Improvements in the method of utilizing electric light for illuminating purposes, and in apparatus for the same." Dec. 24, 1874.

4487.—Truss, T. S., Eastbourne, "Improvements in the arrangement of force-pumps, and the combination and application of mechanical actions for working the same, to supply water or other fluids for the motive power of engines." Dec. 31, 1874.

4490.—Anderson, W., Southwark Street, London, "Improvements in centrifugal pumps." Dec. 31, 1874.

NOTICES TO PROCEED.

3047.—Johnson, J. H., Lincoln's Inn Fields, London, "Improvements in apparatus for compressing gaseous fluids." A communication. Sept. 4, 1874.

3058.—Lake, W. R., Southampton Buildings, London, "Improvements in portable hydrogen and carburetted hydrogen gas apparatus." A communication. Sept. 5, 1874.

3101.—Atkins, T., St. Albans, "Improvements in stoppers, valves, and apparatus for filling and discharging bottles, vessels, store-chambers, mains, or other holders used for containing fluids, liquids, gases, or vapours." Sept. 10, 1874.

3345.—Westwood, W. H., Wright, E., and Wright, E. T., Dudley, "Improvements in stop or regulating valves for regulating or controlling the passage of liquids and gases through pipes or tubes, and for other like purposes." Sept. 30, 1874.

4227.—Sugg, W. T., Westminster, "Improvements in gas-burners, parts of which are applicable to other gas-fittings, and in the method of constructing and manufacturing the same." Dec. 9, 1874.

4247.—Morrell, J. C., Leyland, Lancs, "Improvements in the construction of sewer-pipes, drain-pipes, and modes of treating sewage." Dec. 10, 1874.

4386.—Spier, R., Greenock, N.B., and Mather, J., Gateshead-on-Tyne, "New or improved apparatus, which may be used for condensing vapours or gases for heating liquids, for purifying and bleaching oils and gases, and for other analogous purposes." Dec. 21, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2552.—Higginson, A., Liverpool, "Improvements in and connected with motive-power and pumping engines." July 21, 1874.

2742.—Payton, W., Shelgate Road, Surrey, "Improvements in valves for controlling the delivery of water or other liquids from or into pipes, cisterns, tanks, or other vessels or apparatus." Aug. 7, 1874.

3876.—Forbes, Rev. G. H., Broughton, "Improvements in the manufacture of artificial fuel." Nov. 10, 1874.

3938.—Evans, J., Wolverhampton, "Improvements in pumps." Nov. 16, 1874.

3955.—Hallam, S., and Lamb, W., Manchester, "Improvements in the fittings for glass water-gauges." Nov. 17, 1874.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3529.—Molchin, C. C., "An improved composition oil or liquid, useful particularly for illuminating purposes." Dec. 30, 1871.

38.—Scott, H. Y. D., "Improvements in the purification of coal gas." Jan. 4, 1872.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

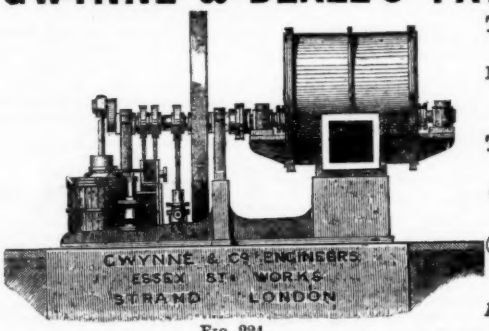


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

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GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

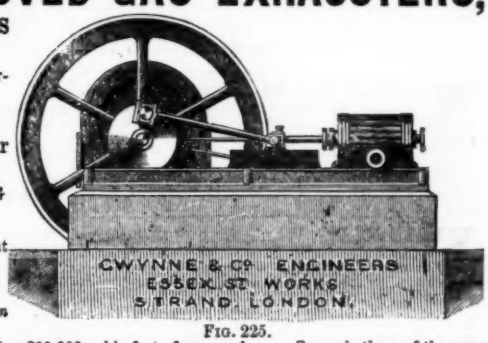

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,

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G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.

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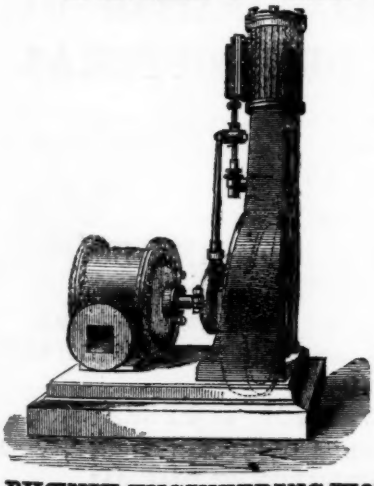
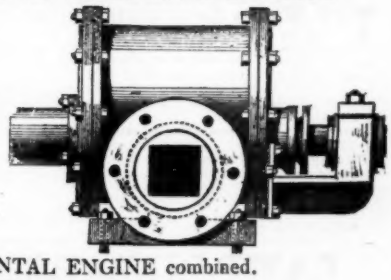


WITH

ENGINE COMBINED

ON

ONE BASE PLATE.



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EXHAUSTERS with HORIZONTAL ENGINE combined.

EXHAUSTERS with OUTSIDE BEARINGS.

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TAR, LIQUOR, and SYPHON PUMPS. GAS-VALVES in stock, 2 to 30 inches.

SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever.

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(JULY TO DECEMBER, 1874)

OF THE

JOURNAL OF GAS LIGHTING, WATER SUPPLY, AND SANITARY IMPROVEMENT.

CLOTH CASES, GILT LETTERED, For binding Vol. XXIV., may now be obtained, Price 2s. 6d.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, by a young Man, a situation as METER-FIXER, Fitter, Index-Taker, Service-Layer, &c.

Address R. M., care of Mr. Smith, 60, Cornwall Road, Lamoeth, LONDON.

WANTED, a Leading Stoker for a small Gas-Work. Permanent situation and liberal wages given to a steady, experienced man. Strict inquiry will be made as to character.

Address J. DAVIES, Gas-Works, Kidsgrove, STAFFORDSHIRE.

WANTED, to Lease a small Gas-Work, where the make is from 60,000 to 100,000 per week. References and guarantee will be given.

Address No. 123, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a second-hand Purifier, 9 ft. square, without valves or connexions. Purifier and cover must be in good condition.

Apply, by letter, to No. 122, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at a small Gas-Works in Hampshire, a MAN to take the entire Charge and Working of same.

Applications to be made in own handwriting, stating age and wages required. Small house on the works, with fire and gas.

Address Messrs. S. PONTIFEX AND Co., 22, Coleman Street, LONDON, E.C.

WANTED, a situation as Working MANAGER in a small Gas-Work, or Foreman Stoker. Thoroughly understands the manufacture of gas in all its branches. Understands the working of an engine and exhauster. Has a good knowledge of service-laying. Good character. Aged 30.

Address F. SCOTT, 130, Needwood Street, Queen's Road, MANCHESTER.

WANTED, by a Gas Manager, at present in Scotland, who will be disengaged in April, the MANAGEMENT of a GAS-WORK, where the make is over 20 millions. Has had 10 years practical experience in the erection and management of Gas-Works. Object for a change is advancement. First-class references or testimonials.

Address No. 124, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ENGINEMAN Wanted, by the Cambridge University and Town Water-Works Company. Must be able to execute ordinary repairs to the engines and pumps. Wages 30s. per week, with house (free of rates and taxes), coals, and garden.

Applications to be made, not later than the 27th inst., to HENRY TOMLISON, Engineer, 4, Bene't Street, CAMBRIDGE.

For Companies to issue to their Gas Consumers.

ADVANTAGES OF GAS

FOR

COOKING AND HEATING.

(NEW EDITION.)

By MAGNUS OHREN, A.I.C.E., F.C.S.

Specimen Copy by post 3d., direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

R. ANDREWS, Bricklayer and Retort-Setter, either by piece or day work; 11 years reference as retort-setter.

Address No. 4, Broomfield Cottages, Bowes Road, Southgate, LONDON, N.

TO GAS AND WATER MANAGERS.

THE Widnes Local Board require the services of a MANAGER of their Gas-Works and Water-Works, who must be thoroughly experienced in the manufacture and distribution of gas, and should understand pumping machinery and water distribution, and be competent to design and carry out additions and extensions of both Gas-Works and Water-Works. Salary £250 per annum.

Applications, with recent testimonials, endorsed "Manager," and addressed to the Chairman of the Gas and Water Committee, Public Offices, Widnes, to be delivered not later than Eleven o'clock a.m. on Monday, the 1st of February next.

Personal canvassing prohibited.—By order, THOMAS BEASLEY, Clerk to the Board.

Widnes, Jan. 16, 1875.

LAMP-PILLARS,

GAS-LAMPS, FOUNTAINS.

Our new Illustrated Catalogue contains a choice and extensive selection of designs for these, and is forwarded to any part of the world on receipt of 12s. 6d., which is allowed on first £10 order.

W. T. ALLEN & CO.,

GAS & WATER ENGINEERS & CONTRACTORS,

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LONDON, E.C.

IMPERIAL GASLIGHT AND COKE COMPANY.

The Court of Directors hereby give notice that the TRANSFER BOOKS of the Company will be CLOSED on Tuesday, the 26th inst., and opened again on Saturday, the 27th of February ensuing. By order,

HARRY CHUBB, Secretary.

33, John Street, Bedford Row, London, Jan. 8, 1875.

STATION-METER FOR SALE.

A STATION-METER, capable of working 2000 feet per hour, and in excellent condition, is to be disposed of. Price, for cash, £35.

Apply to the MANAGER, Gas-Works, Dunmow, ESSEX.

COKE, COKE, COKE.

IMPORTANT TO GAS COMPANIES.

THE Advertiser is prepared to take any quantity of good GAS COKE loaded into his trucks at nearest station.

Address, stating price and quantity, to J. HORTON, Castleford Iron-Works, Castleford, YORKSHIRE.

BOROUGH OF ROTHERHAM.

GAS-WORKS.

THE Corporation of Rotherham are prepared to receive TENDERS for the supply of 504 ft run of Fire-Clay Oval RETORTS, 21 by 15 by 2½ in. thick 3150 FIRE-BRICKS, and six tons of fine ground FIRE-CLAY. The above to be of the best quality.

For drawings and specifications apply to Mr. Goodwin, Gas Manager, Rotherham.

The Corporation do not bind themselves to accept the lowest or any tender.

Tenders to be sent to me on or before Tuesday, the 26th of January, 1875. By order

W. WHITFIELD, Town-Clerk.

IN CHANCERY.

In the Matter of the Companies Acts 1862 and 1867, and in the Matter of the Foreign and Colonial Gas Company, Limited.

THE Creditors, resident within the United Kingdom, of the above-named Company, are required, on or before the 1st day of February, 1875, to send their Names and Addresses, and the particulars of their Debts or Claims, and the Names and Addresses of their Solicitors (if any), to Robert Fletcher, of No. 2, Moorgate Street, in the City of London, public accountant, the official liquidator of the said Company, and if so required by notice, in writing, from the said official liquidator, are, by their Solicitors, to come in and prove their said Debts or Claims at the Chambers of the Vice Chancellor Sir Richard Malins, at No. 3, Stone Buildings, Lincoln's Inn, in the county of Middlesex, at such time as shall be specified in such notice, or in default thereof they will be excluded from the benefit of any distribution made before such debts are proved.

Tuesday, the 16th day of February, 1875, at Twelve o'clock at noon, at the said Chambers, is appointed for hearing and adjudicating upon the Debts and Claims.

Dated this 23rd day of December, 1874.

ALFRED RAWLINSON, Chief Clerk.

WILKINS and BLYTH, 10, St. Swithin's Lane London, Solicitors for the said Official Liquidator.

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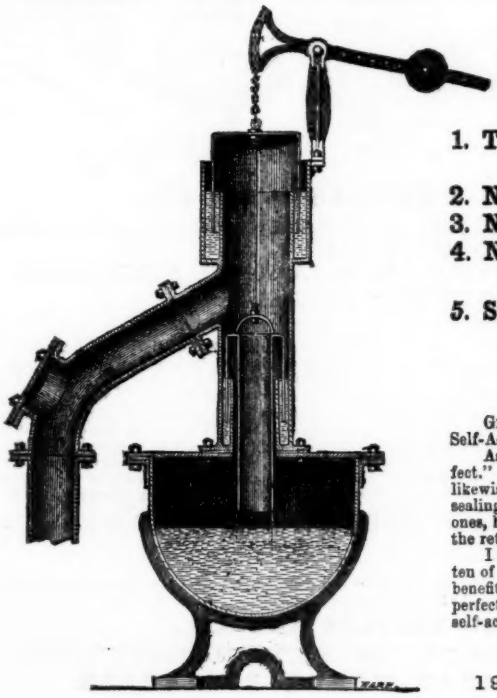

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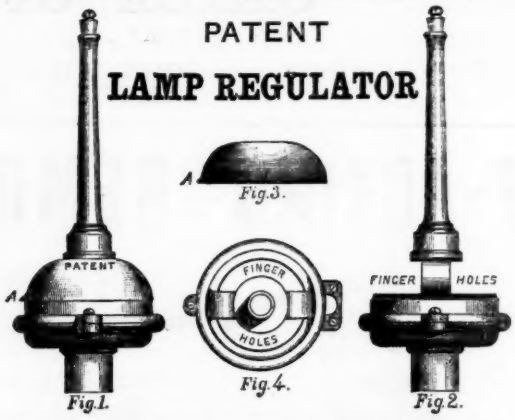

Fig.1. Fig.3. Fig.4. Fig.2.

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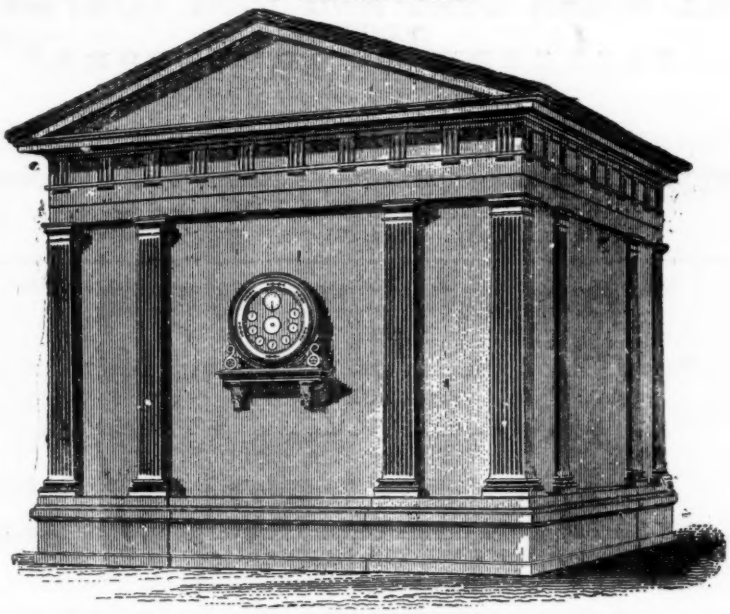

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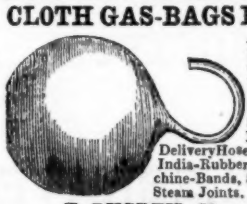

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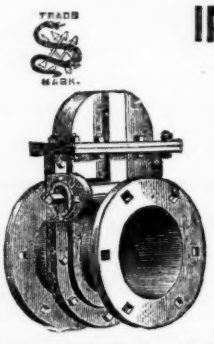

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STRONGLY RECOMMEND A TRIAL OF THEIR
CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

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MUIRKIRK, No. 1, CANNEL
Yields 11,600 cubic feet of 34·8-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

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Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 33-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
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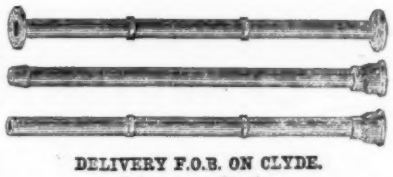

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This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.		Sample worked at Lochore.	
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure	13,095	cubic feet.	11,760	cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	„	34·83	„
Value of 1 cubic foot of gas in grains of sperm	780	„	836	„
Equivalent of a ton of coal in pounds of sperm candles	1,459	„	1,404	„
Durability of 1 cubic foot by 5-inch flame	69	minutes.	71	minutes.
Gravity of the gas (air = 1000)	596	„	594	„

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.		Lochore Waverley.	
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	11,830	cubic feet.	11,145	cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·55	„	33·09	„
Value of 1 cubic foot of gas in grains of sperm	877	„	794	„
Equivalent of a ton of coal in pounds of sperm candles	1,482	„	1,264	„
Durability of 1 cubic foot of gas by 5-inch flame	75	minutes.	67	minutes.
Gravity of the gas (air = 1000)	610	„	597	„

Remarks on the Sample of Capledrae Waverley.—This is a Gas Coal of remarkably fine quality, giving nearly 12,000 cubic feet of 36-candle gas. The coke, although not altogether valueless, is of inferior quality.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company, at

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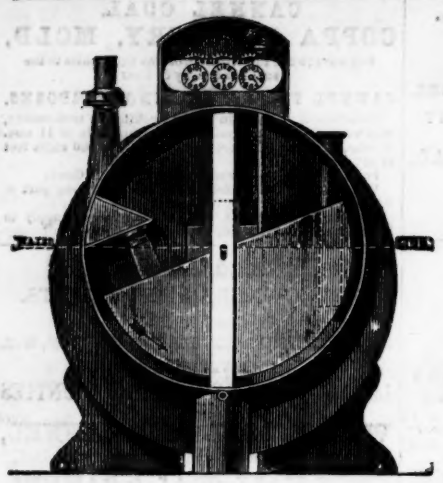

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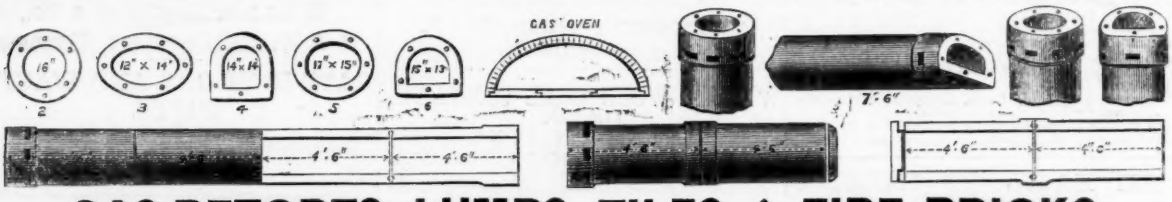

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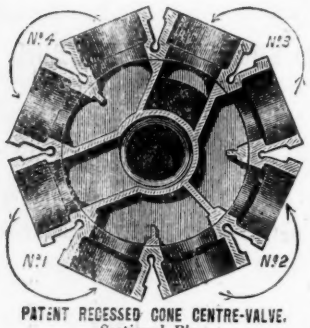

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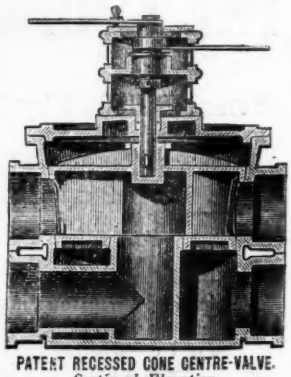

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